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Management Plan for the Bwabata-Okavango Ramsar Site

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SAREP TECHNICAL SERIES – VOLUME 3

MANAGEMENT PLAN FOR THE BWABWATA-OKAVANGO RAMSAR SITE

A REPORT FROM THE SOUTHERN AFRICA REGIONAL ENVIRONMENTAL PROGRAM

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OKACOM

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- Ministry of Environment and Tourism staff in Rundu, Bwabwata National Park, Mangetti National Park, and Wildlife Monitoring and Research Department, Windhoek
- Mukwe Councillor
- Managers and staff of various Namibian tourism establishments along the Okavango River
- Ministry of Fisheries and Marine Resources' Kamutjonga Inland Fisheries Institute
- Members of Kamutjonga Emerging Conservancy and the Kamutjonga Headman
- Members of the Kyaramacan Association
- Members of the Integrated Rural Development and Nature Conservation and Southern Africa Regional Environmental Program

ACRONYMS

AC	advisory committee
BMM	Bwabwata-Mudumu-Mamili National Parks
BNP	Bwabwata National Park
CBD	Convention on Biological Diversity
DEA	Directorate of Environmental Affairs (MET)
DOF	Directorate of Forestry (MAWF)
DSS	Directorate of Scientific Services (MET)
DWA	Department of Water Affairs (MAWF)
EIA	Environmental Impact Assessment
GRN	The Government of the Republic of Namibia
HW	honorary warden
HWC	human-wildlife conflict
IBA	Important Bird Area
IRDNC	Integrated Rural Development and Nature Conservation
IUA	integrated unit of analysis
IUCN	World Conservation Union
KA	Kyaramacan Association
KAZA	Kavango Zambezi Transfrontier Conservation Area
KIFI	Kamutjonga Inland Fisheries Institute
KOAR	Kavango Open Africa Route
LA	local authority
LAC	levels of acceptable change
MAWF	Ministry of Agriculture, Water and Forestry
MET	Ministry of Environment and Tourism
MFMR	Ministry of Fisheries and Marine Resources
MLR	Ministry of Lands and Resettlement
MP	management plan
MT	management team
MWCT	Ministry of Wildlife, Conservation and Tourism (now MET)
MWTC	Ministry of Works, Transport and Communication
NAMPOL	Namibian Police
NGO	nongovernmental organization
ODMP	Okavango Delta Management Plan
OKACOM	Okavango River Basin Commission
PMP	park management plan
SADC	Southern African Development Community
SADF	South African Defence Force
SEA	Strategic Environmental Assessment
TA	traditional authority
TFCA	Transfrontier Conservation Area
TOR	terms of reference

EXECUTIVE SUMMARY

This plan sets out the management strategies and activities for the proposed Ramsar site[1] on the lower Okavango River in Namibia, centered on the Mahango and Buffalo core areas of Bwabwata National Park (BNP). It is part of the Ministry of Environment and Tourism's (MET's) plan for the park and focuses on wetlands.

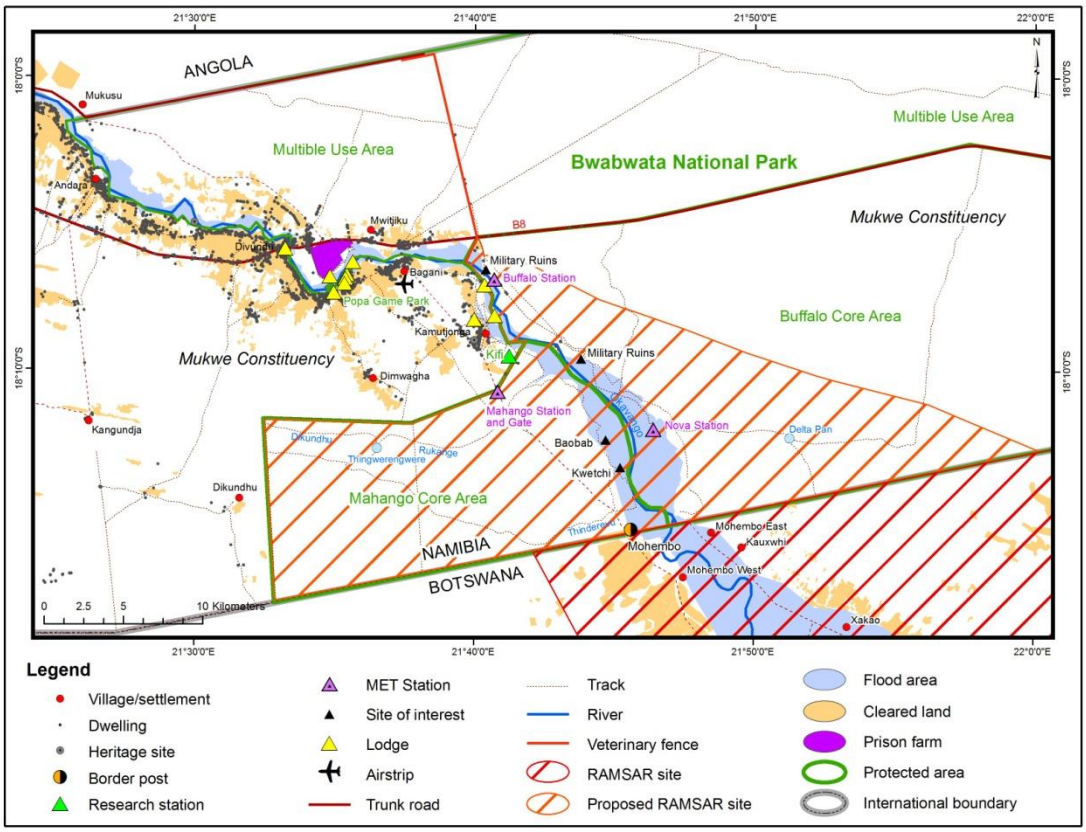

Figure 1. The proposed Bwabwata-Okavango Ramsar Site, Namibia, located within the existing Bwabwata Natrional Park and encompassing the entire Mahango Core Area and the western sections of the Buffalo Core Area

Effective management of the site will ensure that:

- Wetland habitats and their associated ecological processes and biodiversity are conserved.
- Corridors for regional wildlife migration are safeguarded.
- Economic growth provided by the Ramsar site is secured and optimized.
- Access to this area of the Okavango River for Namibian and international visitors is managed sustainably.

[1] Subsequent to the writing of this report, the draft plan was approved as final by the government of Namibia and the site was inscribed as the number 2193 on the Ramsar List of Wetlands of International Importance on 13 December 2013

The overall vision is to manage the wetlands and associated ecosystems in collaborative ways while enhancing socioeconomic development, for the sustained benefit of people and the environment. Based on the existing policy and legal context for the Ramsar site, which emphasizes the importance of collaborative management, as highlighted by the draft policy on Protected Areas, Neighbours and Resident People (MET, 2013), the plan presents priorities for administration, local development, and monitoring, include the following actions:

Administration

- Establish a joint committee with Botswana counterparts to collaborate on management of the Ramsar site.
- Establish a Bwabwata West Advisory Committee, as a forum for collaboration with other ministries and stakeholders.
- Collaborate with the Okavango River Basin Commission to play an active role basin-wide in planning and development.
- Explore establishment of a Greater Bwabwata West collaboratively managed landscape.
- Actively implement the MET's parks and neighbors policy.

Local Developments and Activities

- Phase out hunting in the Mahango Core Area and move it into the neighboring conservancy.
- Prohibit recreational and tourism boating on the Okavango River in the park (from both Mahango and Buffalo sides).
- Increase the road network in the Mahango Core Area that is not linear to the river and accesses the inland pans.
- Set a limit on number of tourists using the Ramsar site based on limits of acceptable change.

Monitoring

- Collaboratively monitor rainfall, river water quantity and quality, vegetation important wildlife species, illegal activities, and fires.
- Set levels/limits of acceptable change and management responses.
- Wherever possible, open migration corridors and facilitate movement of big game.
- Record, remove, and revisit infestations of alien-invasive plants.
- Maintain an overview of upstream plans, proposals, policies, and potential developments that might impact the Ramsar site.

Awareness Raising

- Prepare awareness materials on value and benefits of the Ramsar site for government officials and the public alike.

- Hold awareness events with local communities, in line with the MET's parks and neighbors policy.

PART A: INTRODUCTION

GEOGRAPHIC CONTEXT

The Cubango and Cuito Rivers rise in the Angolan highlands at elevations above 1,700 m, then join to form the Okavango River, which flows over a relatively flat landscape dipping gradually toward the Okavango Delta. The upper stretches of the basin contribute almost all the water that flows through Namibia and into Botswana. The Ramsar site is entirely within the BNP, at the top of the panhandle and where the flow is in a single meandering channel surrounded by a broad area of marshes. After about 100 km, the river starts to split into more channels that splay outward to form the main body of the delta.

The Bwabwata-Okavango Ramsar site is contiguous with the Okavango Delta Ramsar site and lies in the heart of the extensive network of parks and community conservation areas that comprise the Kavango Zambezi Transfrontier Conservation Area (KAZA TFCA) (see Figure 2).

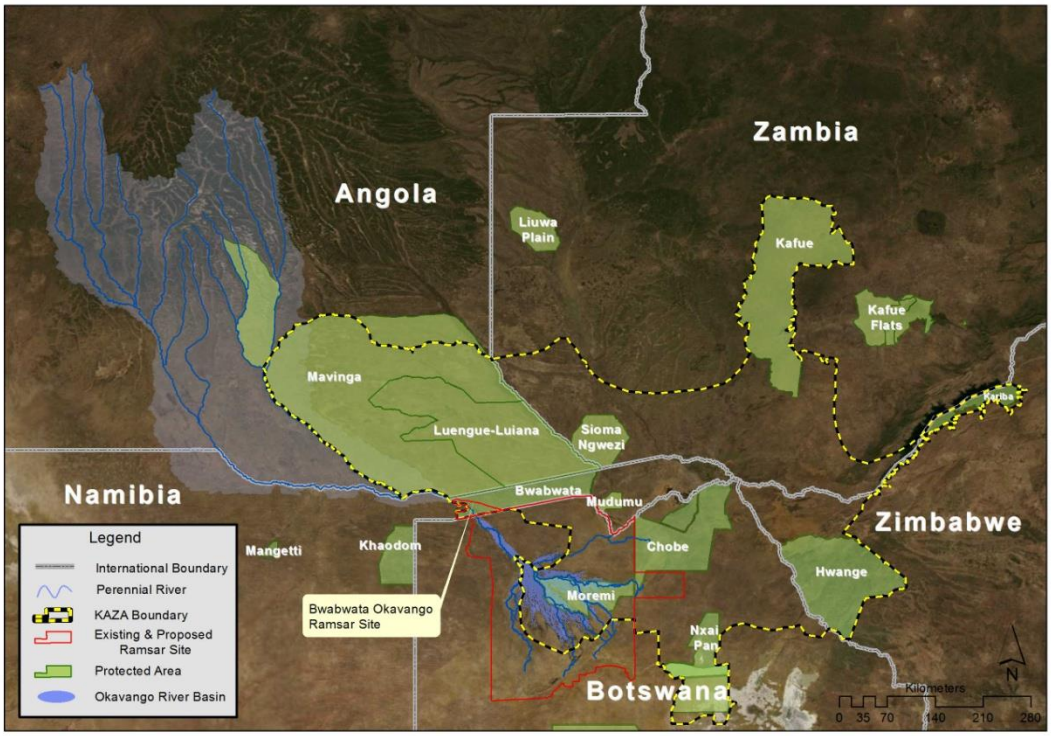

Figure 2. The Kavango Zambezi Transfrontier Conservation Area, a five-country initiative between Angola, Botswana, Namibia, Zambia, and Zimbabwe, encompasses 440,000 km².

The KAZA-TFCA supports large herds of elephant and buffalo, plus rare and endangered species such as roan and sable antelope. The BNP, together with Namibia's other northeast parks, is an important corridor for animal movement within the greater region. In addition to the state-owned parks (shown in the map above), the area includes numerous community conservation areas, forest reserves, and iconic

tourism destinations such as the Victoria Falls and Okavango Delta. KAZA aims to broaden the protected areas' network, to increase biodiversity, expand historical game migration routes, and draw more tourists. In rural communities where local people often bear the costs of living with wildlife, KAZA aims to make the protection of wildlife and wild places economically more attractive (MET 2012).

With only a few fences, Bwabwata forms a crucial transboundary link for wildlife migration between Angola, Botswana, Namibia, and Zambia and for seasonal dispersal to and from the rivers. Bwabwata's core areas serve as key wildlife areas, supplying wildlife to neighboring conservancies and resident communities that can then sell trophy hunting rights to professional hunting outfits and develop tourism on their own land and the multiple use area (ibid).

PLANNING CONTEXT

The BNP recently compiled a management plan (MET 2012) and in 2009 completed a tourism development plan for the Bwabwata-Mudumu-Mamili area (MET 2009).

As an official document of the MET, the plan is a statement of commitment binding its staff to manage the BNP according its provisions. The document also clarifies the responsibilities of other stakeholders (e.g., private sector contractors, public service agencies, neighbors, and tourists) associated with the park to ensure that all their activities are congruent with the plan.

The Bwabwata plan states the vision adopted for the northeast parks:

> "The North-East Parks and the neighboring conservancies will be top conservation priorities in Namibia because they contain rare wetlands, key woodland habitats and a rich variety of wildlife with high tourism potential. In addition these areas will function as critical links for the KAZA TFCA involving five neighboring countries."

Based on these higher level considerations, the MET's objectives for the BNP (MET 2012) include two that are most relevant to the Ramsar site:

- *Protect and maintain biodiversity.* This encompasses protection of indigenous species and red data species, diversity of habitats and natural ecological processes, law enforcement, monitoring and research, and rehabilitation of human-degraded habitats.

- *Maximize regional economic development, based on the principle of sustainable utilization.* This encompasses all aspects of tourism management and direct consumption of resources by local people. The aim is to support rural development by utilizing the basic resource of biodiversity.

In a briefing paper prepared by the DEA and presented by the then Minister of MET to the Namibian Cabinet in 1999, the northeast parks were identified as development

engines for the region due to their natural assets and resulting tourism potential. In this vision, the northeast parks – Bwabwata, Mudumu, and Mamili National Parks – together with bordering communal areas and conservancies – are considered as a unit, as ecologically interlinked. While this management plan applies specifically to the Bwabwata-Okavango Ramsar site, which is located primarily in the BNP, it must consider the area's position within a wide, regional network of conservation areas: conservancies, community forests, and conservation zones in neighboring countries.

Effective management of the Ramsar site, together with the other conservation areas (Khaudum, Mamili, Mangetti, and Mudumu National Parks in Namibia and the Okavango Delta Ramsar site in Botswana), will:

- Ensure conservation of important habitats.
- Safeguard corridors for regional wildlife migration.
- Provide engines for economic growth in poor rural areas.
- Provide access to natural areas for local, regional, and international visitors.

JUSTIFICATION FOR INCLUSION AS A RAMSAR SITE

The Namibia MET submitted the required information sheet for the Ramsar site on October 27, 2011 (see Annex 1). In that document, the name for the site is "Lower Okavango River Ramsar.". In its submission, it provided the following motivation for the area:

- *Criterion 1.* Namibia is the driest country south of the Sahara. Thus, any wetland within the country's borders can be considered rare or unique. The site forms part of the Okavango Delta, a unique inland delta where a large river, the Okavango, disappears into the Kalahari sands.

- *Criterion 2.* The site supports several species of plant and animal that are vulnerable, endangered, or critically endangered, including: African elephant (*Loxodonta africana*), hippopotamus (*Hippopotamus amphibius*), lion (*Panthera leo*), Grey Crowned Crane (*Balearica regulorum*), Lappet-faced Vulture (*Torgos tracheliotos*), Lesser Kestrel (*Falco naumanni*), Slaty Egret (*Egretta vinaceigula*), Wattled Crane (*Grus carunculatus*), White-headed Vulture (*Trigonoceps occipitalis*)

- *Criterion 3.* The site supports one of the highest diversities of plant and animal species in the region.

- *Criterion 4.* The surrounding area is comprised of Kalahari woodlands, which are very dry. The presence of the Okavango River and Delta thus provides a vital habitat for animals by providing drinking water, breeding habitat, and refuge during the dry season.

- *Criterion 5.* White Stork (*Ciconia ciconia*), African Skimmer (*Rynchops flavirostris*), and Spur-winged Goose (*Plectropterus gambensis*) have exceeded the 1 percent population mark at least once during bird counts at the site conducted in early 2009.

PART B: SITE DESCRIPTION

STATUS

The entire Ramsar site lies within the BNP. It takes in the whole Mahango Core Area and the western portion of the Buffalo Core Area (see Figure 3 below), an area of 46,964 ha.

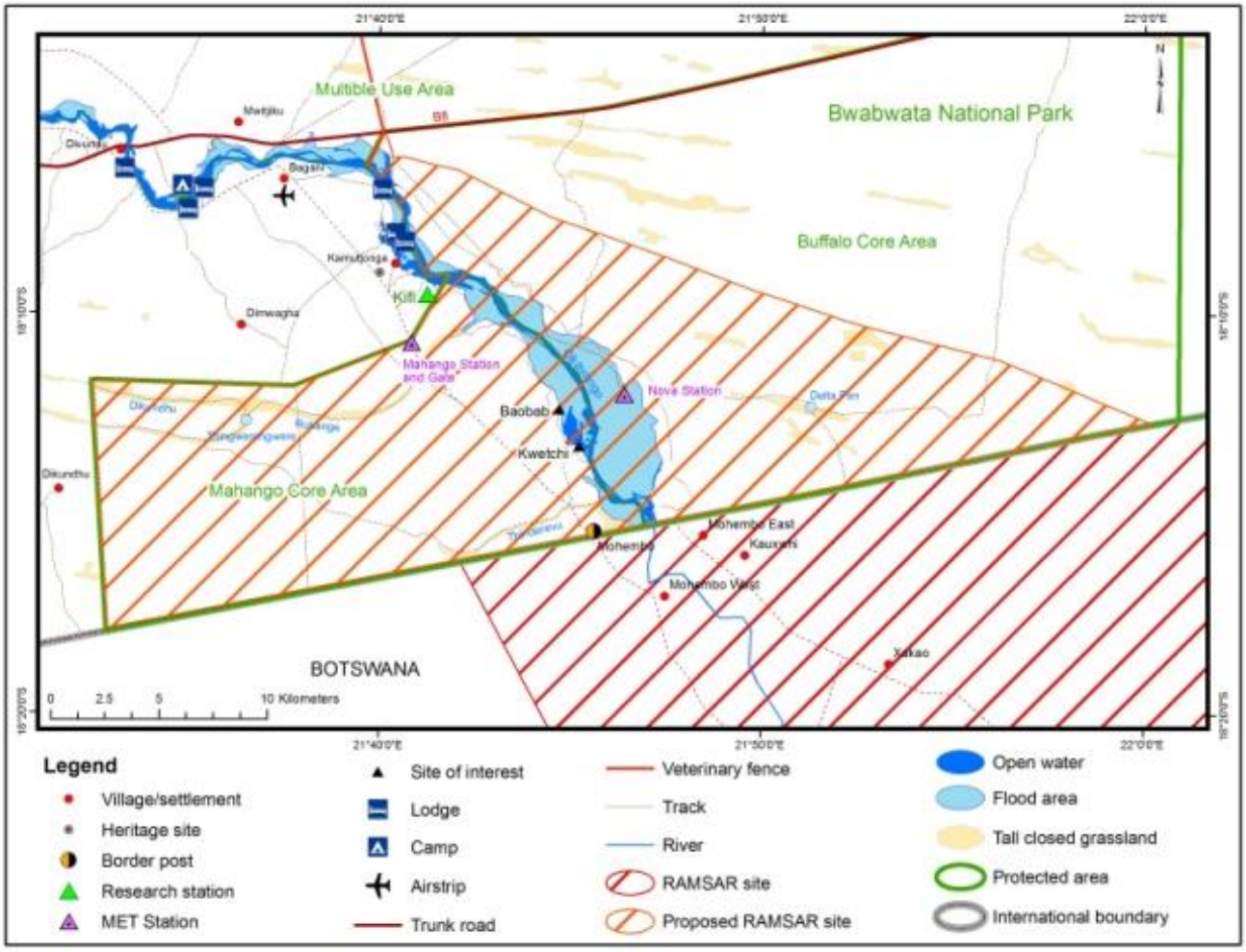

Figure 3. Spatial extent of Phase 1 of the Bwabwata-Okavango Ramsar site.

The selection of the area is based on the following rationale:

- The area's ephemeral drainage systems (omaramba and pans) are hydrologically linked to the main Okavango River, and are key habitats for wetland-associated wildlife.
- The Namibian-Botswana Ramsar sites have a generous common boundary, which creates good opportunities for linking these sites from both a physical and management perspective.
- This entire Phase 1 area falls into the already proclaimed Bwabwata National Park. Therefore, proclamation as a Ramsar site would be relatively straightforward and uncontested.

The idea is to explore, in a highly consultative way, expanding the Ramsar site upstream to the Angola border over time. The Phase 1 area provides an excellent springboard as well as the means for local stakeholders to become familiar and comfortable with the Ramsar concept.

SENSITIVITY AND ZONATION

This section, derived from the BNP management plan (MET 2012), identifies zones based on the sensitivity and scarcity of different habitats. The plan includes guidelines and rules for each zone and categorizes habitats as follows:

- *Very important.* This entails all open water and wetland habitats (floodplain grasslands, riparian thickets, woodlands, and forests).
  - With the sensitivity of this habitat, likely any development within it will require a full environmental impact assessment (EIA), which includes the cumulative impact from tourism activities.
  - The tourism development preference is for non-permanent structures and there is no artificial provision of water.
  - Although the BNP management plan considers boating as a permitted activity on the river, this Ramsar site management plan strictly forbids recreational boating within the Ramsar site (see the inappropriate activities presented in the Management Priorities chapter).

- *Important.* Omaramba grasslands and their associated fringe woodlands form this category.
  - For any developments, an EIA would have to consider at least scoping, a full environmental management plan, and all cumulative impacts. Developments should be located on brownfield sites, with semi-permanent structures.
  - Artificial water provision may be allowed, but no waste storage is permitted.
  - Roads that are no longer used must be restored.
  - Intensity and frequency of game viewing and other recreational uses should be reviewed for their impact on ecological processes and biodiversity.

- *Less important.* This category is for deciduous *Baikaea*- and *Burkea*-dominated woodlands.
  - These areas carry few restrictions on permanent structures but should still preferably be on brownfield sites.
  - Artificial water provision is allowed.
  - Storage and disposal of domestic waste are allowed as long as these are inaccessible to wild animals.

For ease of management, the D3403 Road through Mahango separates the "very important" zone to the east, from the others west of the road.

Special management zones. In addition to the three categories above, the BNP management plan identifies special management zones (see Figure 4).

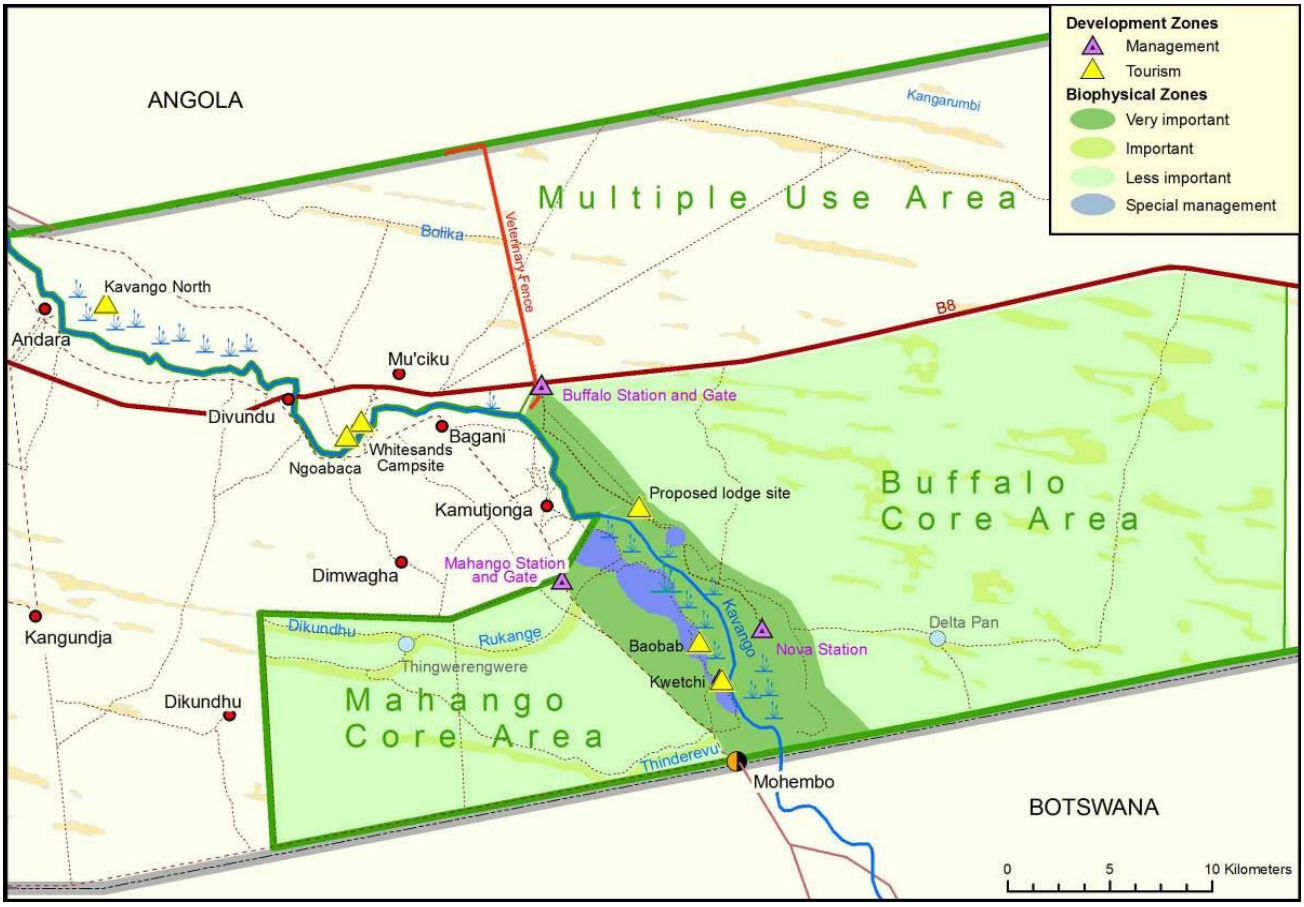

Figure 4. Habitat and special management zones within the general area of the proposed Bwabwata-Okavango Ramsar site (from the Bwabwata National Park management plan).

These are sites that contain features of particular significance, such as exceptional plant communities, important animal habitats, and unique landscapes.Examples of these areas are the baobab trees and highly erodible soils in Mahango Core Area and sacred sites that have special cultural significance. Site-specific guidelines regulate the activities allowed in these zones.

The conditions governing infrastructures and activities in these zones are further elaborated in this management plan. This should be complemented with more detailed mapping of known sensitive areas, such as breeding areas of Pel's Fishing Owl, Wattled Cranes, African Skimmer, and colonies of other wetland birds. This requires input from MET staff as well as partners such as Kavango Open Africa Route (KOAR) and other tourism operators.

SOCIAL, ECONOMIC, AND BIOPHYSICAL INFORMATION

Background information is provided in Annex 3.

PART C: VISION AND OBJECTIVES

In 1999 Namibia's Cabinet adopted the recommendations contained within the briefing paper "A Conservation and Tourism Development Vision for the Caprivi." This document, together with the report on the West Caprivi Socio-ecological Survey in 1990, provided the basis for the subsequent work on development of the North-eastern Parks and Conservancies in Namibia and led to establishment of the following vision:

> "The North-eastern Parks and neighboring conservancies will be top conservation priorities in Namibia because they contain rare wetlands, key woodland habitats and a rich variety of wildlife with high tourism potential. In addition these areas will function as critical links for the KAZA TFCA involving five neighboring countries."

The vision and objectives of the proposed Bwabwata-Okavango Ramsar site on the lower Okavango River in Namibia is a subset of those for the BNP. They should also be seen within the context of the neighboring Okavango Delta Ramsar site in Botswana and the KAZA TFCA, where river basins provide critical connectivity and shared resources. As such, the vision for the Ramsar site is:

> "To manage the wetlands and associated ecosystems within and adjacent to the Bwabwata-Okavango Ramsar site, in appropriately collaborative ways, to enhance biodiversity conservation, ecosystem services and socio-economic development, for the sustained benefit of people and the environment both locally and internationally."

The following objectives are derived from the vision:

- Protect the wetland and associated habitats, biodiversity and ecological processes of the Ramsar site, and where necessary and feasible, restore and rehabilitate degraded systems to their natural, productive states.
- Promote socioeconomic development based on opportunities created by the wetland environment, within the parameters of sustainable development.
- Establish collaborative management partnerships and institutional mechanisms between the various wetland custodians, administrators, and managers across the landscape and international borders, for the ecological and socioeconomic benefit of all stakeholders.
- Explore further expansion of the current Bwabwata-Okavango Ramsar site to other stretches of the Okavango basin, as well as to other systems within the northeastern Namibia.
- Develop, implement, and maintain an effective, efficient management system for planning, monitoring, reporting, and adaptive management of wetlands and associated ecosystems, within the framework of the BNP.

PART D: POLICY AND LEGAL CONTEXT

This management plan operates within an international, regional, and national policy and legal context, which is summarized in Annex 4. National conservation legislation provides the mandate for establishing the Bwabwata National Park, while the Ramsar Convention provides the mandate for establishing the area as a "wetland of international importance." However, a number of other policies and laws have important consequences for managing the Mahango Core Area of the park and the Ramsar site. It is clear from these policies and laws that the Bwabwata-Okavango Ramsar site cannot and should not be managed in isolation.

PART E: MANAGEMENT PRIORITIES

The priorities identified in the table below derive from a series of stakeholder meetings with Ministry of Environment and Tourism staff at regional and local levels, communities on both the Mahango and Buffalo sides of the Ramsar site, Ministry of Fisheries local staff, the Councillor for the Constituency, and the local tourism sector. In addition, these priorities align of the draft management plan for the BNP.

Nature of Threat (Present and Future)	Cause	Response Options
Local Issues		
Illegal activities within Ramsar site from neighboring areas (Namibia and Botswana), such as fishing, reed collection, and hunting	• Poverty • Resentment due to displacement from Mahango but no benefits • Weak community structures and communication channels	• Promote establishment of conservancy neighboring Mahango. • Establish Parks and Wildlife joint committee with counterparts in Botswana (a subcommittee of the Security committee), build and maintain good, regular communications and collaboration. • Establish a Bwabwata West park advisory/steering committee with oversight also for the Ramsar site comprising groups including the MET, Ministry of Fisheries and Marine Resources (MFMR), KA, local conservancy representative, Mukwe constituency counselor, MAWF, MLR, private sector, KOAR, and TA. • *Actively implement the MET's Parks and Neighbors policy with special emphasis on initiatives that create tangible benefits. • **Explore establishment of a Greater Bwabwata West collaboratively managed landscape. • Appoint honorary wardens (select worthy individuals from tour operators, NGOs, community representatives, MFMR staff, and former MET staff) to assist the ministry with law enforcement.
Inappropriate developments in Ramsar site, such as hunting camps, lodges, and campsites in Mahango and in inappropriate places in Buffalo area	• Poor planning • Poor implementation of MET's management plans, policies, and guidelines	• Establish clear development guidelines for Mahango area. All development should be peripheral to core area, including community camp sites, which could have a dedicated entrance gate and some special incentive for guests, such as offering night drives up to three hours after sunset. • Establish clear development guidelines for Buffalo area. All developments should be on brownfield sites. Areas of high sensitivity should be mapped and no development permitted.
Negatively impacting activities in Ramsar site, such as long-term hunting, recreational boating, and excessive tourism pressure	• Inappropriate planning • Weak implementation of rules and regulations	• Zone areas for different activities and consider phasing out hunting in the Mahango Core Area while phasing in hunting in emerging neighboring conservancy. • Strictly implement the "no recreational/tourism boating" policy and zonation in the Mahango stretch of the river, including for the Buffalo side opposite Mahango. This still allows careful use of boats for management, law enforcement, monitoring, and research. • Review and revise the Bwabwata Tourism Plan in light of Ramsar listingwith regard to peripheral development in Mahango and sensitivity mapping for Buffalo area.

Nature of Threat (Present and Future)	Cause	Response Options
		• Establish an upper limit to the number of tourism beds allowed between Divundu and Mohembo on the east and west bank in the immediate area. The MET needs to communicate this to the existing establishments and the Land Board, placing a moratorium on expansion on the west bank. Buffalo site tourism concessions need to be defined and set, such as placing a limit on number of cars entering the Buffalo side and increasing the price of self-drive entries. • Increase extent of road network in Mahango, to reduce traffic congestion along "river drive." In total, add another 10 km of tourism access. The added roads should not be linear along the river and should also access inland pans. • Establish two more picnic/viewpoint sites in Mahango – on the river – to encourage tourists to spend time off the road and out of their vehicles. Proposed sites are the two ex-hunters camps, as well as educational stopover places for school children.
External encroachment onto Ramsar site, such as new settlements and crop fields on boundary and uncontrolled fires	• No or weak incentives for compatible neighboring land uses • Lack of collaborative landscape plans, policies, actions, and institution	• *Implement the MET's parks and neighbors policy, emphasizing initiatives that create tangible benefits and incentives for compatible land uses, such as peripheral camp site just outside Mahango Core Area and a trophy quota; also, investigate role of electric fence/vet services and disease management needs regarding wildlife use outside Mahango. • **Explore establishment of a Greater Bwabwata West collaboratively managed landscape with committee, concise five-year management plan, and annual work plan.
Decline in ecological and biodiversity integrity and health in Ramsar site	• No or inadequate monitoring • No or inappropriate management	• Establish an appropriate monitoring program that addresses both in- and out-of-water indicators to monitor the health and integrity of the Ramsar site. • Establish levels of acceptable change and appropriate management responses as levels are approached (see Annex 5). • Establish protocols for implementing management responses.
Insufficient support for the Ramsar site	• No or insufficient dissemination of information • Inadequate awareness creation among MET staff, neighboring communities and traditional authorities, tourism sector, and visitors	• Prepare appropriate materials (e.g., posters and radio talks) on the Ramsar site and emphasize its value and benefits. • Design and conduct awareness events such as at schools and the park and with traditional authorities. • *Actively implement the MET's parks and neighbors policy with special emphasis on initiatives that create tangible benefits and sustainable use.

Nature of Threat (Present and Future)	Cause	Response Options
River Basin Issues		
Water quantity	• Excessive abstraction	• ***Maintain close collaboration with Department of Water Affairs for data on river flow levels and volumes. • Maintain close collaboration with Okavango River Basin Commission (OKACOM) and its Secretariat to get early information on proposed developments in the Okavango Basin and play active role in planning, EIAs, etc.
		• Promote establishment of a formal notification system (through OKACOM) to ensure that Okavango Riparian States communicate appropriately on projects likely to have transboundary environmental impact (also work with the Basin Management Committee forum for issues/communication).
Water quality	• Pollution • Turbidity	• Establish a water quality monitoring system with Department of Water Affairs (DWA), colleagues in Botswana and Angola, and OKACOM Secretariat, and collaborate with other stakeholders such as the Ministries of Health and Agriculture. • Establish response system in the event that deterioration of water quality is detected.
Invasive aliens	• Both aquatic and terrestrial, dispersed by factors such as river flow, flooding, wind, and cattle/game movement.	• Record, map, remove, and revisit (retreat if necessary) all invasive aliens in and surrounding the Ramsar site. • Prepare a list of the worst invasive aliens for the Kavango region, get it accepted at regional council level (with support from the MET and Directorate of Forestry), and initiate a regionwide eradication program.
Pressure on habitats by mega-herbivores	• Bottlenecks, caused by reduced or altered mobility of species, such as elephant, due to inappropriate management/ fencing.	• Wherever possible, open migration corridors and facilitate transboundary movement of big game.
Global Issues		
Change in climatic conditions and hydrological signature of Okavango River	• Climate change	• Monitor local climatic and ***river flow indicators. • Develop appropriate responses as conditions change (see Biodiversity and Climate Change study; Wolski, P. (2009) Okavango TDA study; Assessment of hydrological effects of climate change in the Okavango Basin (EPSMO)).

PART F: PRINCIPLES, STRATEGIES, AND INDICATORS

This section presents strategies and targets for wetland and associated habitats, biodiversity, and development opportunities within the Ramsar site. The general management strategies in the draft BNP management plan are not duplicated here, except for any high priority issue concerning the Ramsar site.

The structure of this Ramsar management plan follows that of the BNP management plan. There are a number of components of the Bwabwata plan that are still to be determined, for example, specific goals and targets and identifying habitats and species that are most threatened, sensitive, or scarce. This Ramsar plan highlights targets for the wetland components.

MANAGEMENT OF WETLANDS AND ASSOCIATED ECOSYSTEMS

Principle

The rivers, floodplains, swamps and other wetland areas, and the riparian woodland have the highest conservation priority within the BNP plan, with the grassy Omirumba drainage lines, pans, and ecotonal fringe woodlands next in priority.

The comprehensive diversity of wetlands and associated ecosystems should be protected, self-sustaining, resilient, and productive, with both effective ecosystem functioning and evolutionary processes.

Vision

Management of wetlands and associated ecosystems is based on the principle of adaptive management, setting specific goals and objectives, active monitoring, and transparent decision-making. Where feasible, this will promote open wetland systems and free movement of biota, with minimal human intervention.

Strategies

- Management and law enforcement will be in and adjacent to the Ramsar site, both on and off the water, at regular but unpredictable times.

- Game management decisions on those species impacting wetland and associated habitats, based on levels of acceptable change (e.g., elephant and impala numbers), will be taken in an adaptive manner. From time to time, this may require enhancing or damping population growth rates and managing population biomass.

- Alien plants and animals, especially invasive species, will be removed from the Ramsar site and, if possible, from the Okavango basin. Treated sites will be revisited and re-treated as appropriate.

- Sensitivity mapping and zonations will guide land use and development in and adjacent to the Ramsar site.

Activities

Actions	Timing	Progress Record
1. Ensure both day and night patrols are carried out on- and off-water within and adjacent to the Ramsar site, at frequent but irregular times.		
2. Widely disseminate information on zero-tolerance approach to illegal activities and create an MET reward system.		
3. Ensure staff are sufficiently well trained in collection of evidence.		
4. Establish levels of acceptable change (see Annex 5) for key species impacting ecosystems.		
5. Develop appropriate adaptive management responses (see Annex 5), to be implemented as margins of acceptable change are approached.		
6. Where possible, maintain open systems so that wildlife can move seasonally, to reduce excessive population pressure on sensitive wetland and riparian habitats.		
7. Map and remove all alien plants and animals in the Ramsar site, with special attention to invasive species.		
8. Revisit sites and retreat as necessary.		
9. Establish a list of the worst invasive alien plants in the Kavango, especially of those spread by water and favoring wetland and associated habitats. Form a Kavango-wide task team, with the Directorate of Forestry and the Regional Council, to start systematically eradicating these species from the basin.		
10. Develop a sensitivity map for the Ramsar site and adjacent areas based on distribution of threatened, sensitive, or rare habitats and species.		
11. Based on the above, zone the Ramsar site and adjacent areas for different activities and intensities of use.		

MONITORING OF WETLAND AND ASSOCIATED RESOURCES

Principle

Monitoring a limited number of carefully selected water and wetland indicators will allow for timely and judicious adaptive management.

Vision

Minimum, regular monitoring of key indicators will determine change in water quality and selected populations. The information produced from the monitoring systems will feed into adaptive management decision-making.

Strategies

- Monitoring will focus on key indicator species, with an emphasis on ensuring regular data collection at appropriate intervals, cost efficiency, and sustainability.
- Monitoring data will have both spatial and temporal components.
- Monitoring systems will expand from existing systems used within the BNP, with the goal of efficiency in development and ultimately regional and national integration of Ramsar site data.
- Plant resource monitoring, using fixed photo-points, will focus on regular estimates of habitat condition based on long-term vegetation trends.
- Monitoring of key indicator species will be in a systematic, efficient, and repeatable manner.

Activities

Actions	Timing	Progress Record
1. Develop a monitoring plan (see table below and Annex 5).		
2. Implement this plan with appropriate training.		
3. Develop an information system to manage and store monitoring data.		
4. In a timely fashion, provide analyzed information to park, regional, and head office staff and collaborative management committees and stakeholders.		

Preliminary List of Priority Issues Requiring Regular Monitoring		
Sector	**Indicator**	**Notes**
Climate	Rainfall	Local level
River	Water quantity (flow levels/volume)	With DWA, Kamutjonga Inland Fisheries Institute (KIFI)
	Water quality (pollutants, sediments)	With DWA, KIFI
Vegetation	Fixed photo-points covering open water, reedbeds, marshes, floodplains, riparian woodlands, and interface	Local level

Preliminary List of Priority Issues Requiring Regular Monitoring		
Sector	**Indicator**	**Notes**
	(ecotone) between riparian woodlands and dry woodlands, and grassy omirumba	
	Map invasive alien plants, areas clear, and re-growth	Local level
Biodiversity	Hippopotamus population	Local level and as part of northeast wetland aerial surveys
	Crocodile population	
	Lechwe, Reedbuck, and Sitatunga populations	
	Wattled Crane population	
	African Skimmer population and breeding success	Local level and with KOAR members
	Wetland bird trends	
Illegal Activities	Illegal fishing, illegal reed harvesting, illegal hunting, etc.	Local level, and in partnership with community game guards
Fires	Fire scars in wetland and associated habitats	As part of Bwabwata National Park fire monitoring
Basin Developments	Maintain a list of all basin developments throughout system and their likely impact on the Ramsar site	With key partners such as DWA, OKACOM Secretariat, and Kavango Basin Committee

OUTREACH AND COLLABORATION

Principle

Promotion of open, contiguous wetland landscapes, where practical, through regional, park neighbor and resident relations, outreach, and collaboration, strengthen wetland functioning.

Vision

The KAZA TFCA initiative creates good working relations, compatible land uses, and collaborative initiatives with Bwabwata Park residents, neighbors, stakeholders, the private sector, and neighboring authorities in Botswana and internationally.

Strategies

- Build institutional mechanisms to allow for good communications and collaborative management across the wetlands landscape.

- Develop collaborative initiatives around the wetlands and associated resources that promote compatible land uses and create tangible benefits for park residents, neighbors, and stakeholders. This is in line with the Bwabwata-Mudumu-Mamili National Parks tourism development plan (MET 2009) and the ministry's parks and neighbors policy.

- Develop outreach initiatives to residents, neighbors, and stakeholders that emphasize the ecological and economic values, benefits, and importance of wetlands and Ramsar listing.

- Create linkages with neighboring countries, for example, the Ramsar and Wildlife managers in Botswana, the OKACOM and KAZA secretariats, to strengthen regional collaboration and support.

Activities

Actions	Timing	Progress Record
1. Promote and support establishment of a conservancy neighboring the Mahango Core Area of the Bwabwata National Park.		
2. Establish a Bwabwata West park advisory/steering committee with oversight also for the Ramsar site.		
3. Explore establishment of a Greater Bwabwata West collaboratively managed landscape.		
4. In all of the above, actively implement the MET's parks and neighbors policy, with special emphasis on initiatives that create tangible benefits.		
5. Establish a "Parks, Wildlife, and Wetlands (Transboundary Ramsar Site)" joint committee with counterparts in Botswana, building and maintaining good, regular communications and collaboration.		
6. Develop and implement an active wetlands outreach program to surrounding communities and target groups, in collaboration with potential partners such as NGOs, schools, KOAR, other private sector stakeholders, DWA, and NamWater through development of appropriate materials, events, activities, and radio talks.		
7. Appoint "honorary wardens" from individuals in communities, NGOs, the private sector, and other GRN agencies to assist the MET with wetland outreach and law enforcement.		
8. Maintain close communications with local and national organizations such as DWA, MFMR, KOAR, and Kavango Basin Committee.		
9. Maintain close communications with regional bodies such as OKACOM Secretariat and KAZA Secretariat.		

TOURISM MANAGEMENT

Principle

Proper tourism planning and management ensures that the character, sense of place, diversity, and integrity of the wetlands and associated ecosystems are maintained, that

visitors have a high-quality experience, and that local communities benefit in accordance with the MET policy.

Vision

Provision of a unique, high-quality, eco-friendly tourism experience, management and use of best practices, and awareness raising about wetland and woodland ecosystems creates economic opportunities in tourism for structured local communities.

Strategies

- Based on sensitivity assessments and zonation, prepare tourism development guidelines and review and update the Ramsar component of the Bwabwata tourism plan.

- Establish tourism capacity limits for the Mahango Core Area and determine the implication on number of beds on the west bank of the Okavango River between Divundu and Mahango.

- As part of the above strategies, increase the tourism road network and picnic sites in the Mahango Core Area.

- Establish information boards and other material at the picnic sites, with a focus on wetlands, Ramsar, and the ecological and socioeconomic values of wetlands and their associated resources.

Activities

Actions	Timing	Progress Record
1. Establish clear tourism development guidelines for the Ramsar site and adjacent areas, for both Mahango and Buffalo core areas, based on sensitivity mapping and zonation and in line with recommendations of the Bwabwata-Mudumu-Mamili National Parks tourism development plan (MET 2009). In this effort, carefully consider the following: • Phase out trophy hunting in the Mahango Core Area and introduce it in the neighboring conservancy. • Plan all developments in the Mahango Core Area, such as camps sites, to be peripheral to the Ramsar site (i.e., outside of the core area in the neighboring conservancy). • Create special incentives for peripheral community camp site development at Mahango by offering, for example, an exclusive park entry point with exclusive night-drive rights, for example, for three hours after sunset. • Plan all developments in the Buffalo area behind the riparian woodland and only on existing brownfield sites. • Move hunting camp out of riverine area used by photography tourists.		
2. Review and revise the Bwabwata National Park tourism plan in light of the Ramsar listing and the above sensitivity mapping, zonation, and development guidelines.		
3. Establish an upper limit on number of tourism beds that should be developed between Divundu and Mahango based on Mahango Core Area tourism capacity and communicate this to the Land Board and other regulating authorities.		
4. Increase extent of road network in Mahango Core Area to reduce traffic congestion along the “river drive.”		

Actions	Timing	Progress Record
5. Establish two more picnic/viewpoint sites in the Mahango Core Area, on the river, to encourage tourists to spend time off the roads and out of their vehicles.		
6. Establish information boards at the picnic/viewpoint sites, emphasizing wetland ecology and socioeconomic importance of wetland systems.		
7. Strictly implement “no recreational/tourism boating” policy and zonation in the Mahango stretch of the river, including for the Buffalo side. Use of boats on the river, under strictly controlled conditions, may be permitted for law enforcement, management, monitoring, and research.		

PART G: INSTITUTIONAL AND MANAGEMENT ARRANGEMENTS

Since the Ramsar site falls within the BNP, its management will be based on existing park institutional structures and the following additions:

- Transboundary Parks, Wildlife, and Wetlands Joint Committee between Namibia and Botswana
- Bwabwata West Advisory Committee
- BNP Management Team
- Appointment of honorary wardens

The park's draft management plan requires an efficient administrative structure to support financing, procurement, human resources, stores and supplies, and maintenance. As the plan points out that, these aspects are controlled by public service and/or MET policy, procedures, or legislation. While these measures limit park managers' autonomy, innovative operating procedures could address local conditions.

Among other responsibilities, the plan requires the parks managers to:

- Identify gaps in knowledge relating to management and, where appropriate, collaboratively find solutions to improve understanding of the park's natural system and socioeconomic benefits.

- Establish a system of monitoring and documenting all aspects of the park with an aim to decision-making especially regarding:
  - — Socioeconomic benefits of the park.
  - — Development and responsible operation of tourism products.
  - — Compliance with all collaboration agreements.
  - — Adherence to budgets and accountability for finances.

- Develop a respectful and efficient working relationship with staff and other stakeholders, especially resident and neighboring communities.

- Make recommendations and follow up on reviews or changes to this plan, relevant legislation, development requirements, funding, research, and other management-related issues.

Fulfilling the above responsibilities requires more than "business as usual." It is clear that the current institutional structure in Bwabwata needs strengthening, and the best way to do this is to establish partnerships at both transboundary and local levels. In this way, the park (and Ramsar site) is not managed in isolation, but rather as part of a broader landscape. Fortunately, there are substantial skills and resources within other government agencies, neighboring communities, civil society, and the private sector to assist the MET in managing the area. Also, the above-mentioned stakeholders are

willing to assist the ministry, and establishing the required complementary institutions does not require changes to existing legislation. On the contrary, the Nature Conservation Ordinance makes provision for honorary wardens, and the proposed Transboundary Parks, Wildlife and Wetlands Joint Committee could be a subcommittee of the existing Security Committee between Botswana and Namibia.

The proposed new institutional structure is illustrated and elaborated, respectively, in Figure 5 and table below:

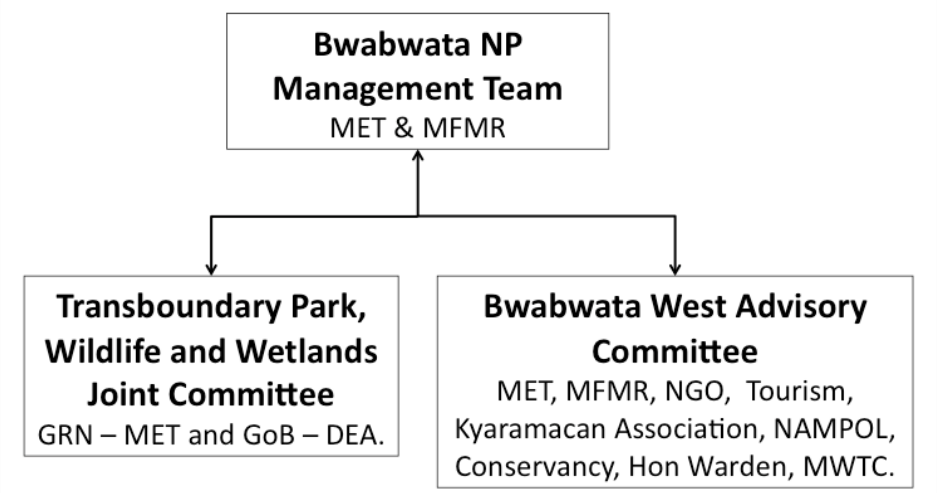

Figure 5. Proposed structure for Bwabwata West management and coordination.

Institution	Terms of Reference
Transboundary Parks, Wildlife and Wetlands Joint Committee	• Meet twice a year. • Build and maintain good, regular communications and collaboration. • Plan and execute joint monitoring and research. • Exchange information and data. • Coordinate transboundary law enforcement efforts.
Bwabwata West Advisory Committee	• Meet at least three times a year, to track progress toward set objectives (e.g., annual work plan), solving problems, mobilizing skills and energy from stakeholders and partners, and capitalizing on opportunities that arise. • At advisory committee meetings, have representatives brief each other on their activities and plans, and exchange views on how their sector interests can be accommodated in the area and park and how they may contribute to management and development. The committee should bounce ideas off the management team, and their advice should be carefully considered. The management team shall serve as the secretariat of the committee, and produce the agenda a month before the meeting and minutes within one month after the meeting. Minutes of all advisory committee meetings must be shared with the BNP Technical Committee. • Suggested membership, per the organogram above, can be an inclusive structure that welcomes newcomers who have ideas and support to offer. • Serve as the area's formal mechanism for consulting with key stakeholders and building an all-inclusive team approach toward park management and development. • Promote a broad-based feeling of ownership about the Ramsar site and park.

Institution	Terms of Reference
Bwabwata West Management Team	• Serve as a forum for cooperation. This management team is not a new structure or institution, but merely works to close cooperation between the MET (lead agency) and MFMR (supporting agency). Both agencies have their own legislation, but also a common objective linked to Namibia's Constitution. • Manage operational decision-making. Both the MET and MFMR should include law enforcement, resource management, and scientific services personnel on their teams. • Meet once every month locally so that the co-management institutions are regularly in contact with each other. Moreover, management team must strive to achieve integrated management, avoiding wherever possible sectoral conflicts and unnecessary "turf wars." The chairperson of the meetings shall rotate every year, with the institution chairing providing the secretariat. Minutes of all management team meetings must be shared with the advisory committee.
Honorary Wardens	*Member Basic Operations and Requirements* • Meet at least three times a year, or more regularly if needed. • Appointed (approximately 10 individuals) on a three-year renewable contract and issued official identification. • Take a short course covering issues including nature conservation and fisheries legislation, park management plan, and how to deal with offenders. • Operate under guidance of park warden and carry out extension, outreach, and information dissemination roles. • Serve voluntarily – no payment. However, the MET may secure fuel for vehicles/boats/aircraft from appropriate sources to support operations. *Selection Criteria* • Must be upstanding member of society respected in his/her societies and keen and committed to take on this voluntary role. *Key Responsibilities* • Provide information to the public and other stakeholders (on an ad hoc basis and within their circle of influence) • When necessary, inform people that they are in contravention of the regulations and request immediate compliance. • Upon reasonable suspicion of illegal activity, stop a person and search a vehicle, boat, or aircraft. This includes inspecting a suspect's luggage in search of any illegal items such as fish, venison, live animals, and plants. Honorary wardens also have the right to demand a person's name in such incidents. • Issue official warning to an offender. • Report an offender law enforcement agencies authorized to arrest/issue a fine. • Assist with monitoring key indicators (see Principles, Strategies, and Indicators chapter).

At the feedback meetings held on this management plan, it was suggested that the MET appoint a technical person to coordinate management and administration of all Namibian Ramsar sites. This is in addition to the focal point role held by the director of scientific services.

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ANNEX 1: RAMSAR INFORMATION SHEET

Information Sheet on Ramsar Wetlands (RIS) – 2009-2012 version

1. Name and address of the compiler of this form:

Holger Kolberg
Ramsar STRP focal point for Namibia
Directorate Scientific Services
Ministry of Environment and Tourism
Windhoek
Namibia

Email: holgerk@mweb.com.na

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DD MM YY

Designation date Site Reference Number

2. Date this sheet was completed/updated:
27 October 2011

3. Country:
NAMIBIA

4. Name of the Ramsar site:
Lower Okavango River

5. Designation of new Ramsar site or update of existing site:

This RIS is for (tick one box only)**:**
a) Designation of a new Ramsar site ☐
b) Updated information on an existing Ramsar site ❑

6. For RIS updates only, changes to the site since its designation or earlier update:

a) Site boundary and area

The Ramsar site boundary and site area are unchanged: ❑

or
If the site boundary has changed:
i) the boundary has been delineated more accurately ❑; or
ii) the boundary has been extended ❑; or
iii) the boundary has been restricted** ❑

and/or

If the site area has changed:
i) the area has been measured more accurately ❑; or
ii) the area has been extended ❑; or

iii) the area has been reduced** ❑

** **Important note**: If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

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7. Map of site:

a) A map of the site, with clearly delineated boundaries, is included as:
i**) a hard copy** (required for inclusion of site in the Ramsar List): □

ii**) an electronic format** (e.g. a JPEG or ArcView image) □

iii) **a GIS file providing geo-referenced site boundary vectors and attribute tables** □ .

b) Describe briefly the type of boundary delineation applied:
The northern and southern boundaries are formed by the park boundary (Bwabwata National Park), whereas the eastern and western boundaries are a fictional line approximately one kilometre from the furthest extent of the floodplain.

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8. Geographical coordinates (latitude/longitude, in degrees and minutes):
Centre: 18° 12' 43"S 21° 45' 36"E
Between 18° 09' and 18° 15' 25"S and 21° 41' and 21° 49' 30"E

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9. General location:
Located in north-eastern Namibia, Kavango Region, nearest large town is Rundu.

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10. Elevation: (in metres: average and/or maximum & minimum)
average 1000m a.s.l., between 990 and 1020m a.s.l.

11. Area: (in hectares)
approximately 7500ha

12. General overview of the site:
The site consists of the lower Okavango River, part of the Okavango Delta pan-handle and permanently or temporarily flooded marshes and floodplains. A buffer of riparian forest and open woodland has been added.

13. Ramsar Criteria:

1 •	2 •	3 •	4 •	5 •	6 •	7	8 •	9
□	□	□	□	❑	□	❑	❑	❑

14. Justification for the application of each Criterion listed in 13 above:
Criterion 1: Namibia is the driest country south of the Sahara thus any wetland within the country's borders can be considered rare or unique. The site forms part of the Okavango Delta, a unique inland delta where a large river, the Okavango, disappears into the Kalahari sands.
Criterion 2: The site supports several species of plant and animal that are vulnerable, endangered or critically endangered. Most notable of these are: African Elephant (*Loxodonta africana*), Hippopotamus (*Hippopotamus amphibious*), Lion (*Panthera leo*), Grey Crowned Crane (*Balearica regulorum*), Lappet-faced Vulture (*Torgos tracheliotos*), Lesser Kestrel (*Falco naumanni*), Slaty Egret (*Egretta vinaceigula*), Wattled Crane (*Grus carunculatus*), White-headed Vulture (*Trigonoceps occipitalis*)
Criterion 3: The site supports one of the highest diversities of plant and animal species in the region and these are very important for the maintenance of biological diversity in the area.
Criterion 4: The surrounding area is comprised of Kalahari woodlands which are very dry. The presence of the Okavango River and Delta thus provides a vital habitat for the animals of the region by providing drinking water, breeding habitat and refuge during the dry season.
Criterion 6: White Stork (*Ciconia ciconia*), African Skimmer (*Rynchops flavirostris*) and Spur-winged Goose (*Plectropterus gambensis*) have exceeded the 1% population mark at least once during bird counts at the site.

15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):
a) biogeographic region:
The site falls within the Afro-tropical realm and comprises of the Zambezian flooded grasslands (ecosystem code AT0907). It lies entirely within the Okavango freshwater ecosystem (ID 569).

b) biogeographic regionalisation scheme (include reference citation):
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Unmack, A. Naseka, R. Ng, N. Sindorf, J. Robertson, E. Armijo, J. V. Higgins, T. J. Heibel, E. Wikramanayake, D. Olson, H. L. Lopez, R. E. Reis, J. G. Lundberg, M. H. Sabaj Perez, and P. Petry *Freshwater Ecoregions of the World: A New Map of Biogeographic Units for Freshwater Biodiversity Conservation* **BioScience** 58:403-414

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16. Physical features of the site:
The geology of the site consists of Kalahari sands of recent origin with underlying rocks of the Nosib Group, part of the Damara Supergroup. The area is almost completely flat; elevations vary by a few metres from north to south. The site forms the beginning of the Okavango Delta panhandle and due to the topography and nature of the soils the water is completely clear and flows slowly. The water reaches its highest level in April or May. Most of the rain falls from December to March and an annual average of 525mm is recorded. Daily maximum temperatures rise above 30°C during most months and average minimum temperatures seldom drop below 10°C in winter (June to August).

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17. Physical features of the catchment area:
The Okavango River catchment covers an area of about 192,500km². For much of its length the river flows across Kalahari sands which are of recent origin. Some older rocks of the Karoo and Damara groups are also present. The river lies within the Kalahari basin which is generally flat, with a difference of less than 1000m in elevation between the headwaters and the delta. Soils in the catchment are dominated by arenosols, and fluvisols deposited by high flows of the river. Due to the underlying geology these soils are low in nutrients and have poor water retention. The climate of the river basin changes gradually from north to south, with higher rainfall in the north and greater rainfall variability in the south. Temperatures increase rapidly from the coldest months of June and July to the warmest month of October. Winds are generally light, and it is completely calm for much of the time.

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18. Hydrological values:
Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

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19. Wetland Types

a) presence:

Marine/coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

Inland: **L** • **M** • N • **O** • P • Q • R • Sp • Ss • **Tp** **Ts** • U • Va Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) dominance:

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20. General ecological features:
The main habitat at the site is the river and its associated swamps and floodplains. There is a narrow fringe of riverine forest which then makes way for open woodland. The site has the highest diversity of bird species in Namibia and also one of the highest diversities of plant and mammal species in the country.

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21. Noteworthy flora:
The flora of the site is dominated by the plants of the permanent swamps, such as papyrus *Cyperus papyrus*, *Phragmtes* reed beds and *Typha* bulrushes. This is one of the few places in Namibia where this type of vegetation can be observed. Adjacent to the permanent swamps are the seasonal swamps and these eventually make way for extensive *Burkea* woodlands which are characterised by tall *Burkea africana, Pterocarpus angolensis* and *Baikiaea plurijuga* trees. Once again, this is one of the few places in Namibia where this vegetation type can be seen.

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22. Noteworthy fauna:
The site supports a great variety of large mammals which include African elephant, hippopotamus, lion, leopard (*Panthera pardus*), African buffalo (*Syncerus caffer*), sable antelope (*Hippotragus niger*), roan antelope (*Hippotragus equinus*) and tsessebe (*Damaliscus lunatus*). Over 400 species of birds have been recorded at the site, the highest number anywhere in Namibia. This is one of the few places in Namibia where rare species such as Slaty Egret, Pel's Fishing-Owl (*Scotopelia peli*) and Narina Trogon (*Apaloderma narina*) can be seen regularly.

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23. Social and cultural values:

a) Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values:

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning?

If Yes, tick the box ❑ and describe this importance under one or more of the following categories:

i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:

ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:

iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:

iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

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24. Land tenure/ownership:
a) within the Ramsar site: Ministry of Environment and Tourism

b) in the surrounding area: State land under various government ministries

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25. Current land (including water) use:
a) within the Ramsar site: Conservation area, popular tourist destination for game viewing, birding and fishing

b) in the surroundings/catchment: The catchment covers three countries: Angola, Namibia and Botswana. Land uses include subsistence and commercial farming, tourism, hunting, fishing, water abstraction for agriculture and human consumption.

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26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:
a) within the Ramsar site: Unknown.

b) in the surrounding area: Increasing human population puts tremendous pressure on the natural resources of the region. Growth of urban areas and their associated waste water as well as large-scale commercial agriculture on the banks of the Okavango River may adversely affect the water quality of the river. Plans for large-scale water abstraction to supply urban areas in Namibia may have the biggest effect on the site.

---

27. Conservation measures taken:
a) The site falls within the Bwabwata National Park.

b) If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate):

Ia ❑; Ib ❑; II ❑; III ❑; IV ❑; V ❑; VI ❑

c) Does an officially approved management plan exist; and is it being implemented?:

d) Describe any other current management practices:

---

28. Conservation measures proposed but not yet implemented:
The site lies within the proposed KAZA Transfrontier Conservation Area.

---

29. Current scientific research and facilities:

Currently no scientific research is taking place at the site but it is planned to do wetland bird counts twice a year. There are no scientific facilities.

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:
e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

31. Current recreation and tourism:
The area is a very popular tourist destination.

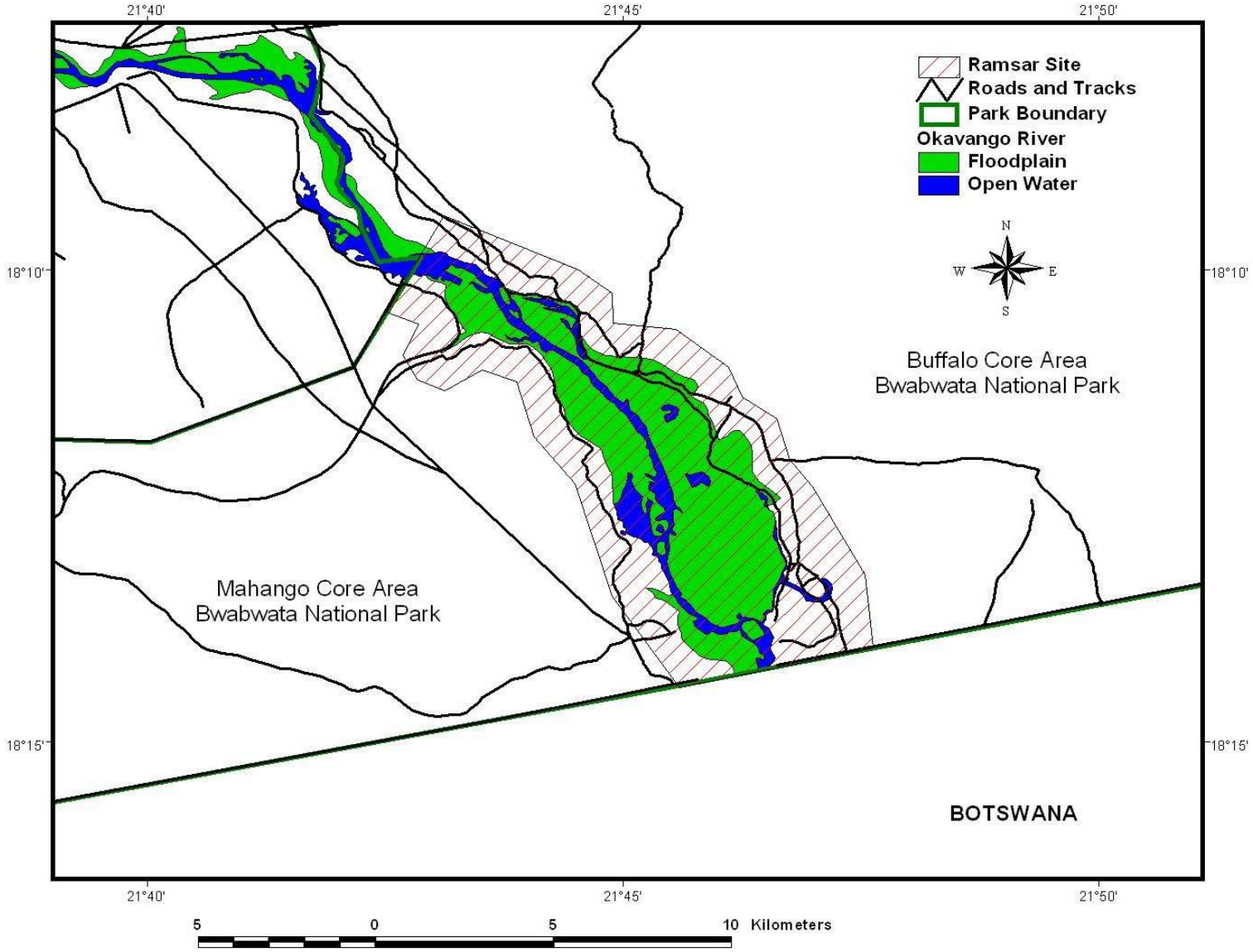
32. Jurisdiction:
Ministry of Environment and Tourism
Directorate Parks and Wildlife Management
Private Bag 13306
Windhoek
Namibia

33. Management authority:
Ministry of Environment and Tourism
Directorate Parks and Wildlife Management
Private Bag 13306
Windhoek
Namibia

34. Bibliographical references:
Mendelsohn, J. and S. el Obeid 2003 *Sand and Water. A profile of the Kavango Region.* Struik Publishers, Cape Town, South Africa.

Mendelsohn, J. and S. el Obeid 2004 *Okavango River. The flow of a lifeline.* Struik Publishers, Cape Town, South Africa.

Please return to: **Ramsar Convention Secretariat, Rue Mauverney 28, CH-1196 Gland, Switzerland**
Telephone**: +41 22 999 0170** • Fax: **+41 22 999 0169** • e-mail: **ramsar@ramsar.org**


21°40'
21°45'
21°50'
18°10'
18°15'
Ramsar Site
Roads and Tracks
Park Boundary
Okavango River
Floodplain
Open Water
N
W
E
S
Buffalo Core Area
Bwabwata National Park
Mahango Core Area
Bwabwata National Park
BOTSWANA
5
0
5
10 Kilometers

ANNEX 2: STAKEHOLDERS CONSULTED

Rundu meeting (9 April 2013)

#	Name	Organization	Email
1	Francis Santambewa	MET Rundu	fsantambewa@met.na
2	Richard Aingura	MET Rundu	raingura@yahoo.com
3	K.P. Ndumba	MET Rundu	kndumba@met.na
4	Peter Tarr	SAIEA	peter.tarr@saiea.com
5	Chris Brown	Sustainable Solutions Trust	chrisbrown.namibia@gmail.com
6	Brian Jones	Environment and Development Trust	bjones@mweb.com.na

Divundu meeting (9 April 2013)

#	Name	Organization	Email
1	Kristian Muriki	Mukwe Councillor	murikik@yahoo.com
2	Peter Tarr	SAIEA	peter.tarr@saiea.com
3	Brian Jones	Environment and Development Trust	bjones@mweb.com.na

Mahango GRN meeting (10 April 2013)

#	Name	Organization	Email
1	Phillip Steyn	MET Rundu (Chief Warden)	psteyn@met.na
2	A. Nzimba	Mahango MET (Ranger)	
3	L.M. Kufunk	Mahango MET (Laborer)	
4	James Sambi	Mahango MET (Park Warden)	
5	F.N. Mutunge	Mahango MET (Laborer)	
6	R.M. Karupu	Mahango MET (Laborer)	
7	Synia Haiputa	Mahango MET (Laborer)	
8	V.T. Erastus	Mahango MET (Workhand)	
9	P. Haukunga	Mahango MET (Workhand)	
10	J.K. Lipange	Mahango MET (Ranger)	
11	M. Shipapo	Mahango MET (Workhand)	
12	J. Naftali	Mahango MET (Workhand)	
13	J.K. Mbumbo	Mahango MET (Laborer)	
14	L. Mukumisha	Mahango MET (Workhand)	
15	A. Muluti Mizi	Mahango MET (Workhand)	

16	Martha Sakaria	Mahango MET (Ranger)	
17	Justin Namuhuya	Mahango MET (Laborer)	
18	G.M. Tukuhupwele	Mahango MET (Ranger)	
19	Christian Thimemde	Mahango MET (Laborer)	
20	T. Naidila	Mahango MET (Laborer)	
21	B.N. Sinonge	Mahango MET (Laborer)	
22	C.K. Thikuro	Mahango MET (Laborer)	
23	M. Muruti	Mahango MET (Workhand)	
24	E. Situmba	Mahango MET (Workhand)	
25	M. Ngombo	Mahango MET (Workhand)	
26	Makoombea	Mahango MET (Watchman)	
27	Peter Tarr	SAIEA	peter.tarr@saiea.com
28	Chris Brown	Sustainable Solutions Trust	chrisbrown.namibia@gmail.com

Mahango Tourism and Fisheries Sector meeting (10 April 2013)

#	Name	Organization	Email
1	Mark Paxton	KOAR chairman and Shamvura	mw.paxton@gmail.com
2	Reinier Burger	MFMR KIFI	aquaculturenam@gmail.com
3	Cameron Wilson	Nunda River Lodge	nundariver@iway.na
4	Otto Grimm	Ngepi Camp	bookings@ngepicamp.com
5	Johan Kesslau	Ndhovu Lodge	blydskopwild@gmail.com
6	Ralf Walter	Mahangu Lodge	Ralfwalter28.10@gmail.com
7	Peter Tarr	SAIEA	peter.tarr@saiea.com
8	Chris Brown	Sustainable Solutions Trust	chrisbrown.namibia@gmail.com

Community meeting, Kamutjonga Village (10 April 2013)

#	Name	Organization	Email
1	Lukas Hamutenya	Kamutjonga emerging conservancy chairperson	
2	Edward Matuku	Secretary to the headman of Kamutjonga	
3	Kapinga Muhero	Kamutjonga Headman	
4	Augustinus Kanyeva	Kamutjonga Headman's representative	
5	Alex T. Muhero	Kamutjonga emerging conservancy vice chairperson	
6	Kosmas Mbungu	Kamutjonga Headman's representative	
7	Jack Thindimba	Kamutjonga community member	
8	Paulus Kakishi	Kamutjonga community member	
9	Franz Kutenya	Kamutjonga emerging conservancy	
10	Sabbina Dinyando	Kamutjonga emerging conservancy vice treasurer	
11	Richard T. Thinyemba	Kamutjonga emerging conservancy vice secretary	
12	Berthold Mushambi	Kamutjonga emerging conservancy transport officer	
13	Thomas Muhero	Kamutjonga emerging conservancy secretary	
14	Paulus K. Muhero	Kamutjonga emerging conservancy public information officer	
15	Tinayimango Ngoshi	Kamutjonga community member	
16	Joltid Kutariga	Kamutjonga community member	
17	Lukas Thinparandi	Kamutjonga community member	
18	Felistas Mupingwa	Member Kamutjonga emerging conservancy	

19	Mathews Kanyanso	Kamutjonga community member	
20	James Sambi	Mahango MET (Park Warden)	
21	Brian Jones	Environment and Development Trust	bjones@mweb.com.na

Meeting with representatives of the Kyaramacan Association, at Mutc'iku, Bwabwata National Park (10 April 2013)

#	Name	Organization	Email
1	Mayenga Mangonga	Kyaramacan Association	
2	Ronnie Johannes	Kyaramacan Association	
3	White Katimba	Kyaramacan Association	
4	Caroline John	Kyaramacan Association	
5	Andre Ndumba	Kyaramacan Association	
6	Brian Jones	Environment and Development Trust	bjones@mweb.com.na

Feedback meeting, Rundu MET Headquarters (11 June 2013)

#	Name	Organization	Email
1	Kenneth Uiseb	MET Deputy Director: Wildlife Monitoring and Research, Windhoek	kuiseb@met.na
2	Richard Aingura	MET Warden, Mangetti National Park	raingura@yahoo.com
3	K.P. Ndumba	MET Rundu	kndumba@met.na
4	J. P. Ntsamba	MET Ranger	
5	Evaristo Enghilai	MET Chief Control Warden, Rundu	enghilai@met.na
6	Phillip Steyn	MET Chief Warden, Parks	psteyn@met.na
7	Rufinus Mukoro	MET, Rundu	
8	W. Mukena	MET Principal Ranger, Rundu	
9	K. Tapiso	MET Principal Ranger, Rundu	
10	Brian Jones	Environment and Development Trust	bjones@mweb.com.na

Feedback meeting, Divundu Constituency office (11 June 2013)

#	Name	Organization	Email
1	Kenneth /Uiseb	MET Deputy Director: Wwildlife Monitoring and Research, Windhoek	kuiseb@met.na
2	Kristian Muriki	Mukwe Councillor	murikik@yahoo.com
3	Brian Jones	Environment and Development Trust	bjones@mweb.com.na

Feedback meeting, Mahango Park Headquarters, (12 June 2013)

#	Name	Organization	Email
1	S. Hanomba	Kamutjonga	
2	Edward Matuku	Secretary to the headman of Kamutjonga	
3	Thomas Muhero	Kamutjonga emerging conservancy secretary	
4	F. Kutenda	Kamutjonga	
5	Cameron Wilson	Owner, Nunda River Lodge	nundariver@iway.na 085 6056819
6	Valentino Punzul	Owner, River Dance Lodge	reservations@riverdance.com.na
7	Mark Paxton	Chairman, KOAR	Mw.paxton@gmail.com
8	E. Fourie	GM, Kayova River Lodge	kayova@iway.na
9	B. N. Sinonge	Mahango MET, Ranger	081 645 9581
10	James Sambi	Mahango MET, Park Warden	081 247 8606/066 259921
11	A Nzimba	Mahango MET, Ranger	081 644 4040/066 259921

12	Martha Sakaria	Mahango MET, Ranger	081 273 9255/066 259921
13	Ronnie Johannes	IRDNC	081 212 2970
14	White Katimba	Kyaramacan Association	081 673 8800
15	Robin Wild	IRDNC volunteer	Wildrobin4@hotmail.com
16	Friedrich Alpers	SAREP/IRDNC	falpers@iway.na
17	Moritz von Hase	Observer	m.espeu@web.de
18	C. Barry	Lodge Owner	081 653 1901
19	Evans Simasitu	SFB, MFMR	081 251 7729
20	Sililo G. Sitentu	CFB, MFMR	081 291 0649
21	Alex Muhero	Kamutjonga Emerging Conservancy vice chairperson	081 773 2996
22	Thaddeus Chedau	Chairperson, Kyaramacan Association	081 898 4088
23	Karel Peter Ndumba	MET Chief Warden CBNRM/EE North East	081 201 4301
24	Kenneth Uiseb	MET Deputy Director: wildlife Monitoring and Research, Windhoek	kuiseb@met.na
25	Brian Jones	Environment and Development Trust	bjones@mweb.com.na

ANNEX 3: BACKGROUND SOCIAL, BIOPHYSICAL, AND ECONOMIC INFORMATION

DEMOGRAPHICS AND SOCIAL STRUCTURE

Population and Traditional Communities

Although different groups have lived in what is now the Bwabwata National Park, the main inhabitants have been the Khwe. Fisch (2008) notes that from 1864 to 1896 the Khwe moved there from the plains known as Mbunda to the north in Angola between the Quito and Kwando Rivers. At various times the Hambukushu people have also lived in the park and interacted with the Khwe. However, there is little historical evidence of extensive Hambukushu settlement in West Caprivi before the 1920s (Fisch 2008), although around 1800 they moved through the area from the Kwando River to reach the Okavango River.

In 1937, the South African Administration declared the West Caprivi as a cattle-free zone and ordered removal of all cattle and their owners. The Khwe were allowed to stay because most of them did not own cattle (Fisch 2008). Some Hambukushu remained in West Caprivi, but in 1970 all remaining Hambukushu were removed by the South African Defence Force (SADF), while the Khwe were again allowed to stay. The population of Khwe in West Caprivi has fluctuated in the wake of key events. Upon independence (1990), about 1,600 Khwe left with the SADF to live in South Africa. In 1998, about 600 Khwe fled to Botswana after allegations of intimidation by members of the Namibian Defence Force. In 2000, more than 1,000 fled into Botswana when the Angolan conflict spilled into West Caprivi (Suzman 2001).

Fisch (2008) reports that the !Xun (also known as Vasekele) had also inhabited parts of the Mbunda plains and the hinterland south of the park in Botswana. !Xun interviewed in 1990 in West Caprivi said !Kung-speaking clans had traditionally used the whole area from southern Angola through West Caprivi, into northwestern Botswana and the Nyae Nyae area of Namibia (Brown and Jones 1994:40). Upon independence (1990), an estimated 600 !Xun lived in West Caprivi (Brown and Jones 1994: 41), but many had left with the SADF to South Africa and others have subsequently left. Now there are estimated to be about 150 !Xun living in the BNP.

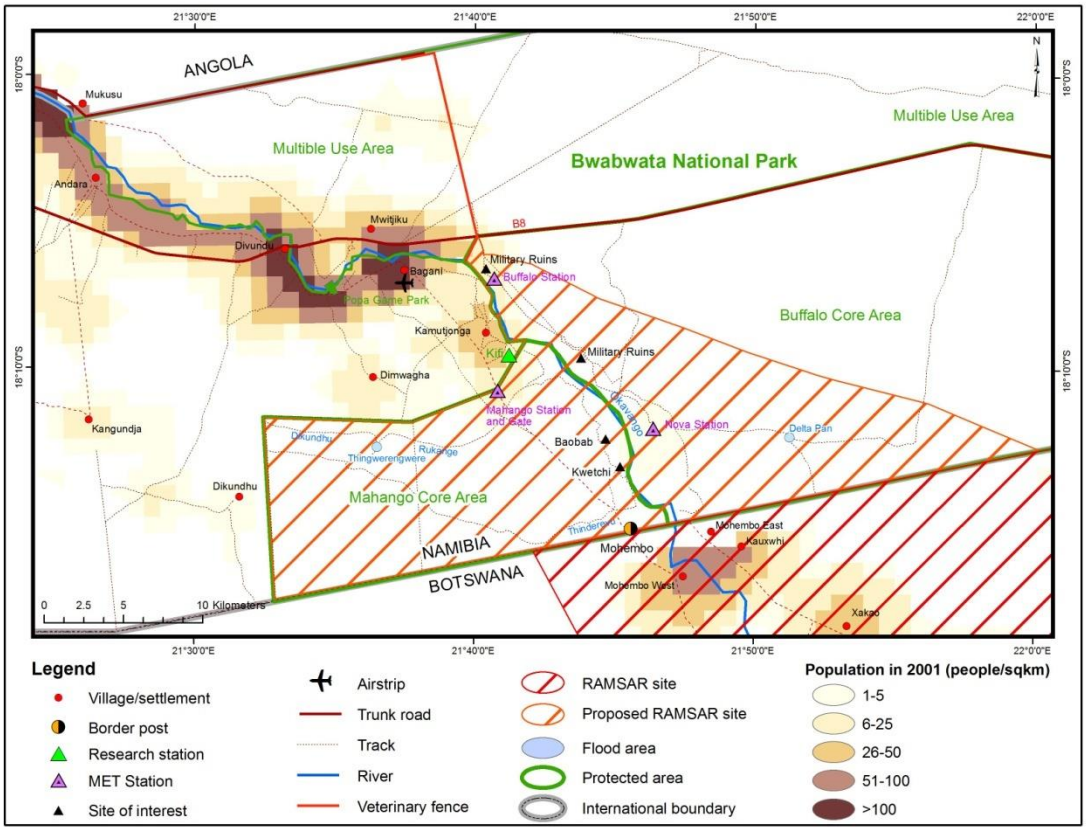


Figure 6. Population density in the lower Okavango area.

The Hambukushu settled in the Mahango area around 1800. What is now the Mahango Core Area of the BNP had always been an important traditional hunting and fishing area. In 1977 refugees from Angola settled in the area. According to the headman of Kamutjonga village, people that settled in the core area were then removed in 1981 and now mostly live at Kamutjonga. Further, he reported that the people did not know they were going to be removed from the area and had been loaded into trucks and that their houses and most of their possessions had been burned.

History of the BNP

The BNP was first proclaimed in 1937 as a Nature Reserve (Fisch 2008) and then again in 1963 as the Caprivi Nature Park (Brown and Jones 1994). There had been plans for the area to become a "Bushman Reserve," as recommended by the 1964 Odendaal Commission, but these plans were never implemented (Nuulimba 2012). The park was re-proclaimed in 1968 as the Caprivi Game Park with a higher degree of conservation protection following a survey that confirmed its significant ecological value (Brown and Jones 1994:3). Soon afterward, however, the SADF declared the park a military zone. The SADF established military bases to launch raids into Angola against The South West Africa People's Organization (SWAPO) forces and withdrew in 1989 shortly before Namibia's independence (Brown and Jones 1994).

Just after independence in 1990, the then Ministry of Wildlife, Conservation and Tourism (MWCT) carried out a socio-ecological survey of the Caprivi Game Park on the status of fauna and flora after the military occupation and of the human population. The resulting report recommended that inhabitants (at the time, mostly Khwe and !Xun San) be allowed to remain there, that conservation plans involve and benefit residents, and that a joint steering or management committee be established comprised of conservation officials and community representatives (Brown and Jones 1994).

In October 2007 the park was officially re-proclaimed as the Bwabwata National Park, covering 6,100 km² and incorporating the Mahango Game Reserve as the Mahango Core Area (MET 2010). The Mahango Game Reserve had been established under an agreement signed in 1982 between the Administration for Kavango and the government of the Territory of South West Africa to proclaim Mahango, Khaudum, and Popa Falls as state protected areas (MET 2012). Under this agreement, 15 percent of all park entrance revenue and 50 percent of proceeds from game harvesting or sales would be paid to the Administration for Kavangos. The agreement retained neighboring communities' right to harvest timber, reeds, and thatching grass, in the park (Administration for Kavangos 1982). Also, based on this agreement, in 1988 the Administrator General of South West Africa approved declaration of Mahango as a game reserve and in February 1989 the Mahango Core Area was officially announced to the public.

The Hambukushu tribal authority made the land available for the Mahango Game Reserve on the understanding that it would receive a percentage of the park's income. However, as indicated above, the Administration for Kavangos received this income based on the agreement with the central government. Further, the agreement did not indicate whether the administration intended to pay any of the income to the tribal authority (Administration for Kavangos 1982). In practice, neither the Administration for Kavangos nor the Hambukushu tribal authority ever received income from Mahango, as the central government's Department of Finance ruled there was no legal basis for it to receive income from the reserve (Department of Finance 1988).

Upstream of the Mahango Core Area, the land is heavily settled along the river and the tarred road to Divundu and beyond to Andara (see Figure 6 above).

Community Involvement

The Ramsar Convention provides guidelines (Ramsar Secretariat 1999) for establishing and strengthening local communities' and indigenous people's participation in management of wetlands, under Resolution VII.8 (see Annex 4 for more details).

Since Namibia's independence in 1990, the MET has gone a long way toward meeting Resolution VII.8 provisions. As a result, policies and mechanisms are in place for local communities' involvement in wetland resource management.

As indicated above, the MWCT's socio-ecological survey on the Caprivi Game Park laid the foundation for current zoning of the BNP and involvement of park residents in several joint management activities with the MET. Another outcome of this and similar surveys conducted in several communal areas was introduction of legislation in 1996 to enable communal land residents to form conservancies (see Annex 4). The law granted residents the same rights over wildlife and tourism as private land owners (MET 2012). The Namibian government has also introduced legislation for establishment of community forests (see Annex 4). Four conservancies, three community forests, and park staff from the BNP and the Mudumu National Park have formed a co-management unit, the Mudumu North Complex, on the park's eastern side. Joint management within this complex covers fire management, game monitoring, anti-poaching activities, game re-introductions, and tourism planning.

No conservancies or community forests have been established on the communal land adjoining the Mahango Core Area. However, residents of Kamutjonga and neighboring settlements are establishing a conservancy. The submission of their application to the MET for the conservancy was reportedly being blocked by the Hambukushu Fumu (chief).

Within the BNP, the MET has established a technical committee comprised of representatives from other government departments, conservancies, community forests, nongovernmental organizations, and the Kyaramacan Association, which represents park residents. The technical committee considers various management issues within the park and makes recommendations to the MET.

BIOPHYSICAL DESCRIPTION

System Functioning and Variability

The Bwabwata-Okavango Ramsar site lies in the uppermost panhandle of the Okavango Delta. Although still quite confined, the river starts to widen from Bagani southwards, and parts of the floodplains in the Mahango Core Area are flooded permanently, similar to extensive areas of marshes downstream in the delta.

Important features of the Okavango River system include the following:

- Okavango water is very clean and clear, mainly because the water filters through and out of Kalahari sands over much of the catchment. Nutrient levels in the water are generally low. This is important for the abundance of papyrus reed beds, an essential ecological component of the swamps.

- The main sediment load in the river comprises sand that is carried as bed load, that is, it is not suspended in the water but moves along the channel beds. Transport of sandy sediment downstream is an important ecological process of channel filling and renewal in the swamps (McCarthy 1992, Wolski 2012).

- The river increasingly becomes a linear oasis as it flows downstream. While average annual rainfall at Mahango is about 500 mm, the terrain receives no rain between April and October and is especially a critical resource for wildlife during this time.

- Flow in the river varies considerably, from season to season and year to year. Seasonal pulsing results in expansion and shrinking of the inundated area, with floodplains absorbing the higher water levels in the later summer months. Floods usually reach heights of 3 to 4 m above the low water level of November (Simmons et al. 1999). The floodplains are very rich in nutrients, providing both food and shelter for breeding fish (Mendelsohn and el Obeid 2003). Annual flooding is the main driving force for breeding fish in the river (Wolski 2012).

- Annual flow variations are also considerable. For example, the highest recorded flow at Mukwe in 1967/68 was almost three times greater than the lowest year, 1995/96. The 1990s and early 2000s were a distinctly dry period, in a cycle of below-average and above-average flows of about 20 to 30 years (Wolski 2012). Riparian woodland along the river channel is entirely dependent on groundwater and benefits from the higher levels reached in very wet years.

Habitats

The Ramsar site, including the whole stretch of the Okavango from the Angolan to the Botswana border, includes permanent swamp, seasonal floodplains, and riparian and dry woodlands, as well as deep perennial channels and rocky and sandy islands.

From where it leaves the Angolan border at Mukwe to about 22 km downstream at Popa Falls, the river channel is rocky in many places, with small rocky outcrops and thickly forested islands at Andara. Downstream of Popa, the river is generally flat and slow flowing, with floodplains up to 4 km wide and areas of marsh and papyrus swamp.

The fringe of the river has a variable strip of riverine forest, containing trees such as jackal berry, mangosteen, knobthorn, and marula. A few small patches exist on the Mahango side with tall jackal berry trees, while two conspicuous species on the edge of the floodplain in the Mahango Core Area are baobab and fan palm. Around Buffalo, on the eastern bank, there are areas with closed riparian woodland dominated by knobthorn, leadwood, sausage tree, and jackal berry. Mature riparian woodland is increasingly rare in Namibia as it is destroyed through human settlement close to the main rivers.

Tree savanna and woodland growing on the drylands away from the river are dominated by *Baikaea plurijuga* (Zambezi teak) and *Burkea africana* (wild syringa) trees.

Between the Okavango River and the Mohembo-Divundu Road, there is a very erodible soil type, possibly related to sodic soils. Vegetation is sparse and makalani palms predominate.

Omarambas leading toward the Okavango River are marked by camelthorn and leadwood trees.

The diversity of habitats in Lower Okavango, together with dynamic shifts in flooding patterns and plant growth, give rise to very high levels of animal and plant diversity (see next section).

Biodiversity

The Okavango Delta contains internationally important biodiversity that has regional and global environmental, social, and economic values (Wolski 2012, MET and NNF 2012). These high values extend into the panhandle, and the Mahango Core Area is recognized as an internationally Important Bird Area that supports globally threatened species (Simmons 1999, MET 2012). It is also the second most species-rich area for mammals in Namibia (Simmons 1999). Overall, biodiversity value is extremely high, as shown in Figure 7.

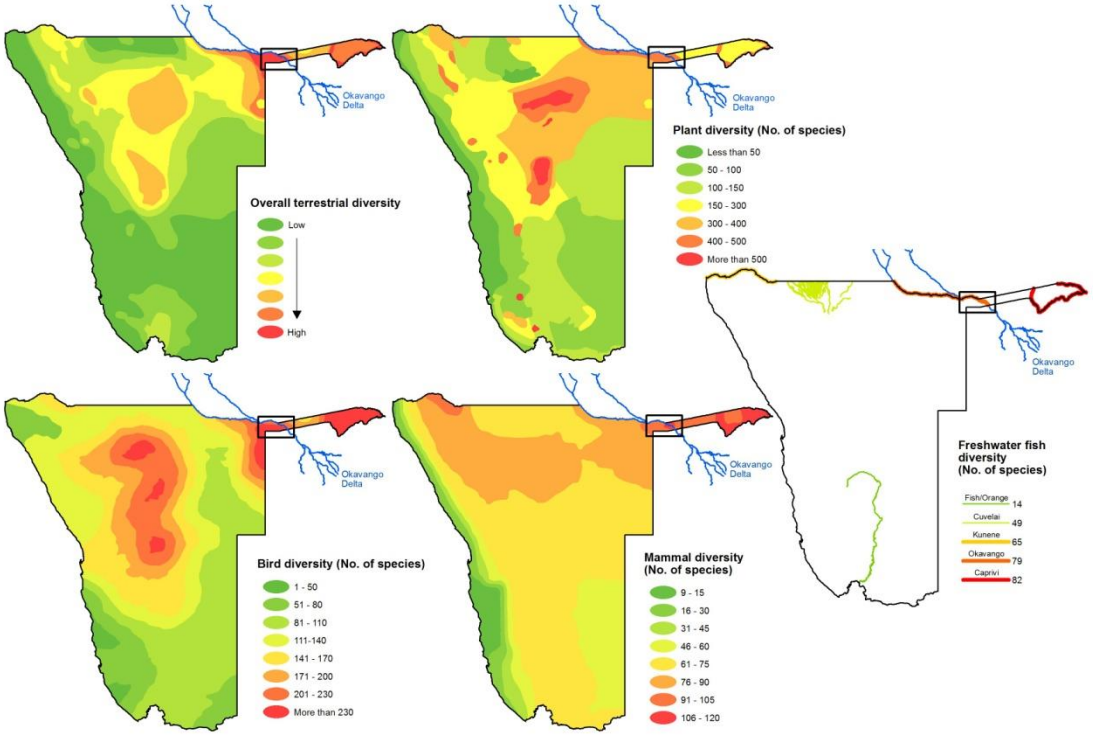


Figure 7. Biodiversity levels for plants, birds, mammals, and fish and overall terrestrial diversity in Namibia. The area of the proposed Bwabwata-Okavango Ramsar site is indicated by a black box.

Birds

About two-thirds of Namibia's bird species have been recorded in Mahango, a result of high richness of both wetland and tropical species overlapping with ranges of semi-arid and dry sub-humid species (Simmons 1999). Bird species of conservation concern include two critically endangered species:

- Eurasian Bittern *(Botaurus stellaris* subspecies *capensis)*
- Pel's Fishing Owl *(Scotopelia peli)*

Mahango and the stretch of Lower Okavango from Mukwe also hold habitat for the following endangered species:

- Hooded Vulture (Necrosyrtes monachus)
- African Fish-Eagle (Haliaeetus vocifer)
- African Skimmer (Rynchops flavirostris)
- Rock Pratincole (Glareola nuchalis)
- Rufous-bellied Heron (Ardeola rufiventris)
- Saddle-billed Stork (Ephippiorhynchus senegalensis)
- Slaty Egret Egretta vinaceigula)
- Southern Ground-Hornbill (Bucorvus leadbeateri)
- Tawny Eagle (Aquila rapax)
- Wattled Crane (Bugeranus carunculatus)
- White-backed Vulture (Gyps africanus)
- Yellow-billed Oxpecker (Buphagus africanus)
- Martial Eagle (Polemaetus bellicosus)

The following vulnerable species are also recorded for this area:

- Lappet-faced Vulture (Aegypius tracheliotus)
- Secretarybird (Sagittarius serpentarius)
- White-headed Vulture (Aegypius occipitalis)

Floodplains and grasslands in the Mahango Core Area are breeding habitat for Wattled Crane. A total of 11 individual cranes were counted in the core area in 2007, out of 29 in the entire Kavango-Caprivi area (Brown et al. 2007). These birds are confined to protected areas, as there is still much disturbance and persecution outside of the parks, even in conservancies.

Sand banks in the Okavango River, with many in the stretch downstream from Popa Falls, are a breeding habitat for African Skimmer (classified as endangered). The wake from speeding boats destroys their sand bank breeding sites, and eggs are also collected by people. Other disturbances cause adult birds to abandon their nests, exposing eggs and chicks to heat and predation.

Riparian forests provide important nesting habitat and perch-hunting sites for Pel's Fishing Owl and African Fish Eagle, while other birds of prey, Southern Ground Hornbill and Yellow-billed Oxpecker, also breed in the large trees in this forest belt.

Mammals

Floodplain grasslands in the Mahango Core Area support wetland-grazing species such as red lechwe, sitatunga, reedbuck, waterbuck, and hippo, while dry woodlands support high-value species such as buffalo, roan, and sable. Elephant populations in the KAZA regionally have increased and more than 2,000 were in the Mahango and Buffalo core areas in 2012 (Anon 2012). This area also supports a healthy population of predators, including the endangered African wild dog and cheetah, lion, and species restricted to the northeast of Namibia such as the serval, African civet, and side-striped jackal. The river contains both Cape clawless and spotted-necked otters.

Seasonal movements of several game species to and from the river are prominent in the omuramba systems of Bwabwata. Large mammals such as eland, elephant, buffalo, and roan and sable antelope graze in the dryland woodlands, and move frequently in and out of the marginal swamp areas during the dry season. The riparian belt is important for species such as bushbuck, impala, large spotted genet, lesser bushbaby, vervet monkey, and a number of bat species. The BNP draft management plan lists 40 mammal species of special concern in the northeast parks, and 85 percent of them are in the Ramsar site.

Reptiles

About 100 crocodiles are in the Okavango River downstream of Bagani to the Botswana border (about 20 km), according to a 2004 estimate (Brown et al. 2004). A less complete census suggested the population had doubled by 2007 (Aust 2007). Although the World Conservation Union does not list the Nile crocodile as threatened, the population is diminishing due to overall reduction in habitat (Alexander and Marais 2007).

There are 16 reptile species listed in the BNP draft management plan, all of which are either known or expected in the Ramsar site.

Biodiversity and Ecological Functioning

Productivity of the entire ecological system depends on the interrelationships between flooding, habitats, and animals. This quote from the Okavango Delta Ramsar site report on ecological thresholds (SAIEA 2012) is equally relevant to the upper panhandle:

> "The biodiversity of the Okavango Delta is a consequence of unique dynamic shifts in flooding patterns, driven by the Okavango River flood pulses that in turn force constant changes in patterns of plant succession and dependent animals. Temporal variations in flooding also cause accumulation and sudden mobilization of nutrients, which

are readily used by well adapted plant species. As a consequence, locally high biological productivity occurs, which in turn results in high numbers of grazing and predatory species. The ability to move with the areas of productivity, and in and out of the delta system to and from other systems like the Kwando-Linyanti, Chobe, and Makgadikgadi wetland systems, during extreme climatic conditions is key to the maintenance of the delta's wildlife populations."

LAND USE AND ECONOMICS

Ecosystem Services

The following ecological services identified for the Okavango Delta (Wolski 2012) have been adapted for the upper panhandle where the Bwabwata-Okavango Ramsar site is proposed:

Ecological Benefits of the Okavango Delta	
Provisioning	
Food	• Fish • Birds and other wild game • Aquatic plants • Wild fruits • Nuts
Freshwater	• Storage and retention of water for domestic, industrial, and agricultural use
Fiber and fuel	• Logs, grass, and reeds for construction, firewood, peat, and livestock fodder
Biochemical	• Roots, tubers, bark, leaves, and other materials from biota for medicines
Genetic material	• Inherent value in genes of wild populations, for example, for finding resistance to plant or animal disease or pathogens, resistance to arid climate, and intrinsic value in endemic, rare, and endangered ornamental plants
Regulating	
Climate regulation	• Sink for greenhouse gases (carbon dioxide) • Influences on local and regional temperature, evapotranspiration, precipitation, and other climatic processes
Water regulation (hydrological flows)	• Groundwater recharge that feeds riparian vegetation • Flood distribution/redistribution regulated by long-term sedimentation/aggradation processes in the permanent swamp and floodplain vegetation
Water purification and waste water treatment retention	• Recovery and removal of excess nutrients and other pollutants by the permanent swamp/channel reed vegetation • Removal of excess solutes from the water through the process of riparian evapotranspiration
Erosion regulation	• Slowing river flow and retention of soils and sediments in permanent swamp and underlying peat • Riparian vegetation cover prevents soil erosion along channel banks
Natural hazard regulation	• Flood control/dispersal, and water retention during drought help regulate, respectively, destructive flash flooding and loss of ecosystem functioning and species die-off during drought
Pollination	• Varied seasonal habitat for pollinators
Cultural	
Spiritual and inspirational	• Islands in the Andara area have traditional cultural significance
Recreational	• Excellent wilderness, sense of place, and game viewing value

Ecological Benefits of the Okavango Delta	
Aesthetic	• Many people attracted by the beauty of the area
Educational	• Opportunities for formal and informal education and training
Supporting	
Soil formation	• Sediment retention and accumulation of organic matter in peat and on alluvial floodplains
Nutrient cycling	• Drying allow for dessication, grazing, fire, and decomposition processes that recycle nutrients "locked up" in plant material, sediment, and animal dung, allowing their release once more back into forms available for plant growth and productivity on return of the flood
Refuge	• Permanent swamp and other habitat types provide breeding areas, nursery, and refuge for invertebrates, fish, and aquatic birds and mammals

Turpie et al. (2006) also identified a set of ecosystem services or indirect use values attributable to the Okavango Delta and estimated values for carbon sequestration, wildlife refuge, groundwater recharge, water purification, and scientific and education values.

Subsistence Agriculture

Local residents' main land uses in the area upstream of the Mahango Core Area Ramsar site are crop cultivation and livestock farming. Small-scale farming of a few hectares of millet, sorghum, and maize with small numbers of goats and cattle is dominant. Farm production depends on two factors: rainfall and soil quality (Mendelsohn 2009). Soils in Kavango are generally poor with low nutrient levels. About 80 percent of all rain falls between December and April, but the amount, timing, and effectiveness of rainfall vary greatly from year to year and within any one rainfall season. Crops do well when good and regular falls are received but fail when little or no rain falls. Harvests are, therefore, variable. Similarly, livestock suffer substantial mortality when conditions are very dry. Livestock are an important asset and relatively few animals are slaughtered or sold, with annual off-take amounting to about 7 percent. Most slaughters are for domestic consumption or to obtain cash for household use (Mendelsohn 2009).

Small-scale farming, as practiced by the great majority of households is a low input/low output activity that generates little income because (Brown 2010):

- Fields are small.
- Soils have limited fertility.
- Yields are low.
- Labor is often limited.
- Surplus harvests are rare.
- Markets are small.

Thus, most rural households obtain additional income from the wages, business incomes, remittances, and pensions of family members.

Millet (mahangu) is the dominant crop, planted on about 95 percent of all cultivated land. The remaining 5 percent consist of maize, sorghum, and vegetables such as melon, groundnuts, beans, spinach, and pumpkins. Millet predominates because it is the only cereal that grows relatively well on sandy, nutrient-poor soils where the climate is characterised by low, erratic rainfall and long spells of dry weather (Mendelsohn 2009).

Large-Scale Agriculture

There are several large-scale agriculture schemes upstream of the Mahango Core Area Ramsar site. These include:

- An irrigated prison farm within the BNP on the east bank of the river close to Divundu.
- An agricultural project north of the B8 tarred road just after the bridge and also within the park.
- 1, 000 ha Green Scheme agricultural projects at Shadikongoro and Shitemo.

Under the Green Scheme approach, government facilitates through subsidies establishment of commercially viable irrigation farms in communal areas and links them with small-scale irrigation farmers, who receive services from the large-scale operations, mentorship, and training.

The economic case for irrigated farming in Kavango has not been fully established (Brown 2010). A study by Liebenberg (2009) emphasizes that production of staple foods under irrigation is not viable in Kavango. He found that with higher value crops under irrigation, such as aromatic oils, all capital costs can be recovered at market prices within 13 years, while staple foods such as maize and wheat are not capable of recovering their capital development costs. An investigation by Schuh et al. (2006) that included a Kavango Green Scheme case study, showed commercial irrigation to be only viable if a significant portion of the crops planted are high value. However, a study by Barnes et al. (2009) suggests that irrigation, even with high-value crops, would not be financially profitable and only economically viable when factoring in its overall such as job creation, purchases of goods, and fuel.

If poorly managed, irrigation schemes can undermine water quality of the Okavango River through pesticides, fertilizer, and soil run-off and water quantity through over-abstraction. Both factors affect aquatic biodiversity and consequently fisheries (Brown 2010).

If new schemes are located close to national parks or inside them as is the case of the agricultural project and prison farm in the BNP, biodiversity losses and increased human-wildlife impact are likely (Brown 2010). One of the major problems associated with the Kavango irrigation projects is that they have not been subjected to EIAs.

Tourism

Tourism is an important land use in and around the Mahango Core Area of the Ramsar site. In April 2013 there were at least nine tourism establishments operating. These included seven lodges upstream of the core area, one guesthouse at Divundu, and the Ngoabaca community camp at White Sands on the east bank of the river inside the BNP. The Popa Falls Rest Camp of Namibia Wildife Resorts was closed for redevelopment. Planned development in April 2013 included a new lodge at White Sands under community concession, and additional rooms and campsites at Namibia Wildlife Resorts Popa Falls. The BNP Tourism Development Plan (Massyn et al. 2009) also makes provision for development of a mid-market lodge on the east bank of the river opposite Andara and for a mid-market lodge of about 60 beds at the old Pica Pau Military Base in the Buffalo Core Area. In addition, the BNP tourism plan makes provision for activity concessions in the Mahango Core Area that could give concessionaires the following:

- The right to use and maintain an exclusive picnic site on the Kavango River inside Mahango.
- Access to additional tracks along the Kavango River and in the western woodland.
- The right to conduct guided walks (under rules set by the MET).
- After-hours access to Mahango to conduct night drives under rules set by the MET and subject to EIA.

The plan makes provision for boating within Mahango to be operated from the concession at Pica Pau but does not for tourism accommodation in the core area.

Data for 2007/8 (Massyn et al. 2009) indicate that the nine tourism facilities operating in the Mahango Core Area had 102 rooms, 237 beds, and 78 campsites. The rooms operated at an average annual occupancy of 32 percent and the campsites at 22 percent, although well-established and well-run lodges were operating at between 43 percent and 48 percent occupancy. These establishments generated 217 jobs and a wage bill of N$3.5 million (approximately $350,000), mostly going to local employees. Tourism activities include vehicle-based game viewing, guided walks, guided boating, fishing, trophy hunting, guided cultural excursions, bird watching, self-drive 4x4 excursions, and camping.

Trophy hunting takes place within the Buffalo Core Area (the Bwabwata West Concession). In April 2013 the hunting camp was located on the river below the site designated for the Pica Pau lodge concession. Although there is currently low use of this area by photography tourists, the hunting camp is too close to tourist tracks and should be moved to reduce potential for conflicts between the two forms of tourism. Although trophy hunting has taken place in the Mahango Core Area in the past, the BNP tourism development plan recommends that there should be no hunting there and in April 2013 no concession had been awarded.

Transportation

The Bagani airstrip is north of the Mahango Core Area. In terms of road access, a high-quality tar highway (the B8) connects the area with Rundu to the west and Katima Mulilo to the east. The C48 road links Divundu with the Mohembo border post with Botswana via the Mahango Core Area, about 50 percent of which is tarred and 50 percent dirt.

Livelihood and Economic Impact

The natural resource and land use activities described above have been subjected to several empirically based analytical livelihood and economic valuation studies. Turpie et al. (2006) conducted a quantitative survey of 450 households on small-scale crop production, fishing, livestock keeping, and natural plant and animal use for the Okavango Delta Ramsar site. The study applied livelihood and economic models and nonconsumptive and hunting tourism enterprises in the valuation. Similar estimates were also applied to other linked economic activities in the delta Ramsar site. Turpie et al. (2006) also estimated the value of ecosystem services, or indirect use values, attributable to the Okavango Delta. As described above, the study also estimated carbon sequestration, wildlife refuge, groundwater recharge, water purification, and scientific and education values.

Barnes et al. (2009) used the delta study, combined with additional focus group and key informant surveys, to analyze livelihoods and economic valuation of current flow-based activities in the entire Cubango-Okavango basin. The basin was divided into 12 spatial units (integrated units of analysis, or IUAs) where socioeconomic systems and values were more or less homogeneous. The Bwabwata-Okavango Ramsar site falls into IUA 9, which embraces the river wetland system between the road bridge at Bagani and the border with Botswana. IUA 9 was, in turn, divided into a section of the river with a human population between Bagani and the Mahango Core Area gate, which was entirely protected within the BNP (King et al. 2009). Livelihood values and economic contributions of the activities that are, or might be, affected by flow change in the river wetlands system were estimated in both these subunits.

The findings of Turpie et al. (2006) and, in particular, Barnes et al. (2009) have been taken, adapted, and applied to the present study. Here, the aim is to measure the current livelihood and economic values of the Bwabwata-Okavango Ramsar site and assess the degree they can be expended or secured through establishment of the Ramsar site.

It is difficult to delineate values for IUA 9 that are attributable to the presence of the Ramsar site, so the values below are for those land use activities that are closely associated with the Ramsar site. They cover household land and natural resource use and tourism activities that take place close to the Ramsar site boundary. Small-scale fishing, natural plant resource harvesting, crop production, livestock keeping, community campsites, and employment in tourism lodges are included as household activities. Commercial business activities include medium-scale nonconsumptive

lodge and camping facilities and safari hunting. The commercial irrigation scheme referred to above, which just falls in the northern edge of IUA 9, is not included. The values associated with the Ramsar site also include an aggregate value for ecosystem services or indirect use. The Ramsar site's river and floodplain wetlands and woodlands are likely to provide ecosystem services in net carbon sequestration, wildlife refuge, water purification, groundwater recharge, and scientific and education value. (Of note, wild refuge includes larger game with value for hunting dispersing into neighboring parts of Bwabwata and conservancies, as well as fish dispersing upstream into household fishing areas.) These values are similar to those measured for the Okavango delta by Turpie et al. (2006), the present report has crudely calculated here using those values.

The values are measured in 2012 Namibia dollars, where N$1.00 = US$0.12, and in livelihoods and economic contribution as follows:

- Livelihood values refer to wages and salaries and profits retained by investors/owners.
- Economic contributions refer to factors including national income in wages and salaries, profits, taxes and fees, payments to and of capital, and land/resource rentals and royalties.
- Economic values are opportunity cost to the national economy.
- Direct economic values are those contributions made directly to the national income by the enterprise or activity.
- Total economic values are those contributions made directly as well as those induced by the direct income earning activities.
- Total economic contributions involve linkages within the economy and the effect of the income multiplier.

The following table shows the current annual livelihood, direct economic, and total economic values that have been estimated for the Bwabwata-Okavango Ramsar site:

	Enterprises Number	Aggregate values		Total economic
		Livelihood	Direct economic	
		N$	N$	N$
Household Activities				
Fishing	260	328,100	396,500	951,700
Reed harvest	150	126,500	128,900	309,400
Grass harvest	200	392,700	414,700	995,200
Rain-fed crops	180	70,900	42,200	101,300
Livestock	100	90,800	62,500	150,000
Tourism (jobs, profits)	9	7,669,500	7,669,500	15,339,100
Commercial business activities				

Tourism (nonconsumptive)	9	7,669,500	19,792,000	39,584,100
Tourism (safari hunting)	1	1,533,900	3,958,400	7,916,800
Ecosystem Services				
Ecosystem service value	-	-	8,551,900	8,551,900
TOTAL		17,881,900	41,016,700	73,899,300

The values estimated are significant. Some N$18 million is generated annually in livelihood income, about half of which would accrue to local households. The tourism activities associated with the Ramsar site are overwhelmingly dominant, with nonconsumptive tourism and safari hunting providing, respectively, 75 and 15 percent of private income. Tourism makes direct use of the wildlife and riparian habitats that would be explicitly secured and protected through the presence of the Ramsar site.

The annual direct economic income contribution for Namibia associated with the Ramsar site is estimated at N$41 million. Figure 8 below shows how this is divided. Again, tourism is dominant, with nonconsumptive tourism at 67 percent and safari-hunting tourism comprising 10 percent of this. The estimated value of ecosystem services amounts to 21 percent of the total value. Further developments in tourism associated with the site, in accordance with the tourism development plan of Massyn et al. (2009), will further increase the tourism value.

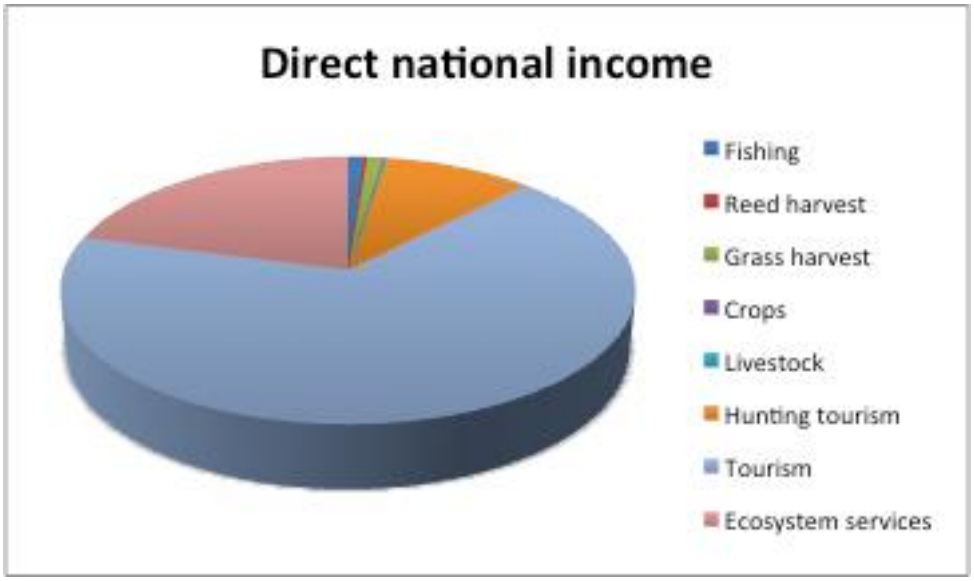


Figure 8. Relative proportion of annual direct economic income contribution from the Ramsar ite to Namibia.

The last column in the table above shows what the total annual economic impact of the Ramsar site is likely to be when the backward linkages associated with direct economic activities are considered. The total economic impact throughout the whole economy is likely to be almost twice as big as the direct values.

Human wildlife conflict results in costs for local human residents in IUA 9, for example, when elephants encroach on croplands or hyena prey on livestock. Given the relative importance of tourism, these costs are likely to be small relative to the benefits from wildlife. Work by Jones and Barnes (2006) in Caprivi region and that of Brown (2011) tended to confirm this.

The analysis above indicates that in addition to its ecological and biodiversity attributes, the Bwabwata-Okavango Ramsar site will help secure and strengthen household and economic income generation, which is very significant.

ANNEX 4: POLICY AND LEGAL CONTEXT

This annex summarizes the international, regional, and national policy and legal context of the proposed management plan.

INTERNATIONAL

Namibia has conservation obligations as a signatory to international conventions. The most important of which for the Mahango Core Area of the Ramsar site are presented below.

Ramsar Convention

The convention calls on signatories to stem human encroachment and destruction of wetlands while recognizing the fundamental ecological function of wetlands and their economic, cultural, scientific, and recreational values. It provides for each contracting party to designate suitable wetlands for inclusion in a List of Wetlands of International Importance. Further, it commits the contracting parties to promote conservation of their listed wetlands and promote the wise use of the wetlands. Contracting parties are expected to consult each other for conservation of shared water systems.

Resolution VII.8 under the convention provides guidelines for establishing and strengthening local communities' and indigenous people's participation in wetland management (Ramsar Secretariat 1999). The resolution calls upon contracting parties to "encourage active and informed participation, and the assumption of responsibility, by local communities and indigenous people in the management of Ramsar-listed sites and other wetlands." The resolution urges contracting parties to create the legal and policy context to facilitate this participation and emphasizes the importance of financial mechanisms and incentives in promoting involvement of local communities and indigenous people.

Convention on Biodiversity

The main objectives of the Convention on Biodiversity (CBD) are conservation of biological diversity, sustainable use of its components, and fair and equitable sharing of benefits arising out of the use of genetic resources. Various implementation decisions under the CBD refer to wetland conservation. CBD decision IV/4 explains the status and trends of biological diversity of inland water ecosystems and explores options for conservation and sustainable use to be incorporated. The fourth joint work plan between the Ramsar Convention and the CBD reaffirms the importance of ongoing cooperation between Ramsar and the CBD and outlines actions to conserve and sustain biodiversity (Blumenthal et al. 2009).

REGIONAL

Namibia has signed SADC protocols that also affect management of the Mahango Core Area as a Ramsar site. The Revised Protocol on Shared Water Courses aims to promote cooperation between member states for sustainable management of shared water courses. The protocol commits signatories to preventing, reducing, and controlling pollution and environmental degradation of water courses, preventing introduction of alien species that might be detrimental to the health of the water courses, and protecting and preserving the aquatic environment. To minimize negative impacts on the Okavango River system while meeting socioeconomic needs of the riparian states, the three Okavango Basin states Angola, Botswana, and Namibia signed an agreement in 1994 that formed the Permanent Okavango River Basin Commission. This is a high-level committee that fosters cooperation and coordination between the three states.

The SADC Protocol on Fisheries aims to promote responsible and sustainable use of living aquatic resources and of aquatic ecosystems. In particular, signatories are expected to conserve aquatic ecosystems, including biodiversity and unique habitats that contribute to the livelihood and the aesthetic value. Signatories commit to establishing inland protected areas for conservation of critical habitats and endangered species, especially migratory species in transboundary areas.

NATIONAL

National policies and legislation provide the framework for environmental conservation and establishment of protected areas in Namibia. However, it is also important to consider policies and legislation from other sectors that affect adjoining areas to the Mahango Core Area of the Ramsar site.

Wildlife Policy and Legislation

The Nature Conservation Ordinance (No. 4 of 1975) is the primary legislation providing for protected areas and for conservation and use of wildlife in Namibia.

The Nature Conservation Amendment Act, 1996 (Act 5 of 1996) amends the Nature Conservation Ordinance so that residents of communal areas can gain the same rights over wildlife and tourism as freehold farmers. Registered conservancies gain the right to trophy hunting and tourism concessions, use of huntable game, and to apply for the use of other categories of game.

The MET has developed a draft policy on Protected Areas, Neighbours and Resident People that, among other things, aims to:

- Promote development of compatible forms of land use in areas adjoining protected areas.
- Promote integration of protected areas into local economies.

- Promote ecosystem management across larger landscapes in cooperation with protected area neighbors, including transfrontier conservation areas.

Water Legislation

The Water Resources Management Act of 2004 provides for establishment of river basin management committees that would conserve and control water resources in its management area, promote community participation, and prepare a water resources plan for the basin.

A new Water Resources Management Bill has been drafted by the Ministry of Agriculture, Water and Forestry to replace the existing act, but it has not been enacted yet. The bill replaces the concept of management "committees" with management "institutions" and broadens the definition of such institutions. It makes provision for the water management institutions to charge fees for water use in the basin. The bill also makes provision for formation of sub-basin management committees or institutions to address specific issues within distinct parts of the management area.

Forestry Legislation

The Forest Act (No. 12 of 2001) makes provision for establishment of various types of "classified forest," including community forests. The management authority of a community forest may dispose of forest produce from the community forest or permit animal grazing and carrying out agricultural activity or any other lawful activity. The institutional arrangements for community forests are similar as those for conservancies.

Inland Fisheries

The Inland Fisheries Resources Act (No. 1 of 2003) provides for conservation and protection of aquatic ecosystems, sustainable development of inland fisheries resources, and control and regulation of inland fishing (GRN 2003b). The act enables the minister to determine the general policy for conservation and use of the inland fisheries resource. The minister may declare any area of inland water to be a fisheries reserve.

Environmental Management Legislation

The Environmental Management Act (2007) presents 13 "Principles of Environmental Management" that apply to government institutions and private persons. The following principles are particularly relevant:

- Renewable resources shall be used on a sustainable basis for the benefit of current and future generations of Namibians.

- Community involvement in natural resource management and sharing in their benefits shall be promoted and facilitated.

- Equitable access to sufficient water of acceptable quality and adequate sanitation shall be promoted, and the water needs of ecological systems shall be fulfilled to ensure sustainability of such systems.

- The precautionary principle and the principle of preventative action shall be applied.*

- There shall be prior environmental assessment of projects and proposals that may significantly affect the environment or use of natural resources.

- Sustainable development shall be promoted in land-use planning.

- Namibia's movable and immovable cultural and natural heritage, including its biodiversity, shall be protected and respected for the benefit of current and future generations.

- Generators of waste and polluting substances shall adopt the best practicable environmental option to reduce such generation at the source.

- Reduction, reuse, and recycling of waste shall be promoted.

The act contains a schedule of "listed projects and activities" for which an Environmental Clearance Certificate must be acquired before the project or activity may go ahead. The schedule includes projects and activities such as:

- Construction of canals and channels including the diversion of normal flow of water in a riverbed and water transfer schemes between water catchments and impoundments.

- Construction of dams, reservoirs, levees, and weirs.

- Erection and construction of tourism facilities and associated structures, including all-wheel-drive trails or activities related to tourism that may have a significant effect on the environment.

- Erection and construction of veterinary, protected area, or game-proof and international boundary fences.

- Alteration of natural wetland systems.

- Declaration of an area as an aquaculture development zone in terms of section 33 of the Aquaculture Act, 2002 (Act No. 18 of 2002).

Regional Councils

The Regional Councils Act of 1992 (GRN 1992) gives regional councils the power to undertake development planning with a view to:

- Physical, social, and economic characteristics of the region.
- Distribution, increase and movement, and urbanization of the population.
- Natural and other resources and economic development potential of the region.
- Existing and planned infrastructure, such as water, electricity communication networks, and transport systems.
- General land use pattern.
- Sensitivity of the natural environment.

IMPLICATIONS FOR THE PROPOSED RAMSAR SITE MANAGEMENT PLAN

Based on the summary above, clearly the Bwabwata-Okavango Ramsar site cannot and should not be managed in isolation. The Ramsar Convention puts considerable emphasis on the need for involvement of local communities and indigenous people. The MET's draft policy on Protected Areas, Neighbours, and Resident Communities emphasizes the need for protected areas to be part of larger landscape conservation planning and implementation and for communities to benefit from protected areas. Conservancies and community forests provide institutional mechanisms for communities to cooperate with and benefit from protected areas, particularly in larger landscape partnerships. Lastly, the SADC conventions emphasize the need for transboundary cooperation. This factor is particularly important for the Lower Okavango River, given that the area downstream in Botswana is also a declared Ramsar site and that Namibia has obligations to its downstream neighbor for ensuring the health of the river within its territory.

Considerable powers relating to land and physical planning reside with regional councils. There is a need for managers of the Bwabwata-Okavango Ramsar site to be aware of regional land use and infrastructure planning upstream that might affect the health of the river and of the Ramsar site. Moreover, the MET and other stakeholders need to engage actively in regional and international planning forums and with other sectors that are involved in land use and planning.

ANNEX 5: LEVELS OF ACCEPTABLE CHANGE

The concept of "levels of acceptable change" or "limits of acceptable change" (LAC) was developed in the 1980s to replace the concept of "carrying capacity." It can be used for conservation management, tourism management, resource abstraction, and any other activity where impact can be measured on landscape, ecosystem, habitat, and biodiversity parameters, as well as on people's perceptions of sense of place and what is acceptable or not acceptable to them. Some of the advantages of LAC are that it measures and responds to more fundamental values – and essentially looks at the required outcomes (goals and objectives) rather than at superficial indirect indicators. For example, it will look at the state of the habitat (e.g., riparian woodlands) and monitor this to determine whether the riparian belt is improving, stable, or degrading, rather than monitoring just elephant numbers and responding on some carrying capacity guideline. The use of LAC is particularly applicable in highly variable systems where numbers of wildlife at any one time are relevant only if other parameters such as past rainfall, river flows, and veld condition are known. Thus, instead of having a fixed carrying capacity for different species, a population range is derived: not less than x and not more than y, but the number at any one time would depend on the state of the habitat that itself would be managed within an acceptable range.

The LAC details are not explicitly set out in the Ramsar management plan because the specific goals and targets, monitoring program, and management guidelines for the key habitats and species most important to the BNP and to the Namibian context have not yet been elaborated. The development of LACs for the Ramsar site should be done as part of setting goals and targets for the overall park, together with development of an appropriate monitoring and reporting system and clear guidelines on adaptive management responses.

The table on the next page provides an example of how such a LAC system might be set up. This is indicative only. The actual details should be worked out as part of a BNP process. Similarly, monitoring for the Ramsar site should be integrated within the monitoring framework of the BNP and should include the components shown in the table, many of which overlap with and will be part of the overall park monitoring system.

Habitat	Desired Condition	Means of Measurement	Source of Impact	Management Limits/Levels	Type of Intervention	Responsible Institution
River	Clean, low turbidity, unrestricted flow, and dynamic - all representing pristine condition and supporting a full diversity and abundance of life	Water quality and quantity Status of key indicator fish species, hippos, crocodiles, African Skimmers, and other wetland birds	Pollution	Use baseline to set limits	Monitor and track down pollution sources	KIFI/DWA
			Water abstraction	Use time series to establish seasonal and annual variation	Monitor all upstream projects and intervene if excessive cumulative abstraction	DWA
			Illegal harvesting (fishing, poaching)	Zero illegal off-take	Law enforcement	MET/MFMR/ Namibian Police
			Disturbance by poorly planned and/or managed tourism	Tourism numbers, activities, impacts (tourism plan)	Enforce compliance with tourism plan	MET
Floodplains and Swamps	Healthy, diverse, dynamic, and high production to support diversity and appropriate abundance of species, both resident and seasonal	Status of key species, namely Sitatunga Lechwe, Reedbuck Wattled Cranes, and other wetland birds	Illegal harvesting (poaching)	Zero illegal harvesting	Law enforcement	MET/MFMR/ Namibian Police
			Disturbance by poorly planned and/or managed tourism	Tourism numbers, activities, impacts (tourism plan)	Enforce compliance with tourism plan	MET
			Too frequent or too infrequent fires in reedbeds and on floodplains	Fire management plan – types (cool or hot burns), frequency, areas, seasons and cumulative	Fire management, monitoring, and adaptive management	MET/ Directorate of Forestry
Riparian Forest	Healthy, diverse riparian belt, and good recruitment of young trees and shrubs to support diversity of species reliant on this habitat	Tree species diversity and density, rate of tree kill, rate of recruitment, density of understory, and key faunal indicator species, e.g., Bushbuck and Western Banded Snake Eagle	Elephants, when there are too many and confined to riparian belt	Minimum and maximum desired number of elephants	Harvest groups provide meat to local communities	MET
			Kudu (browser), when too many	Minimum and maximum desired number of kudu	Capture and translocate	MET
			Impala (browser), when too many	Minimum and maximum desired number of impala	Capture and translocate	MET

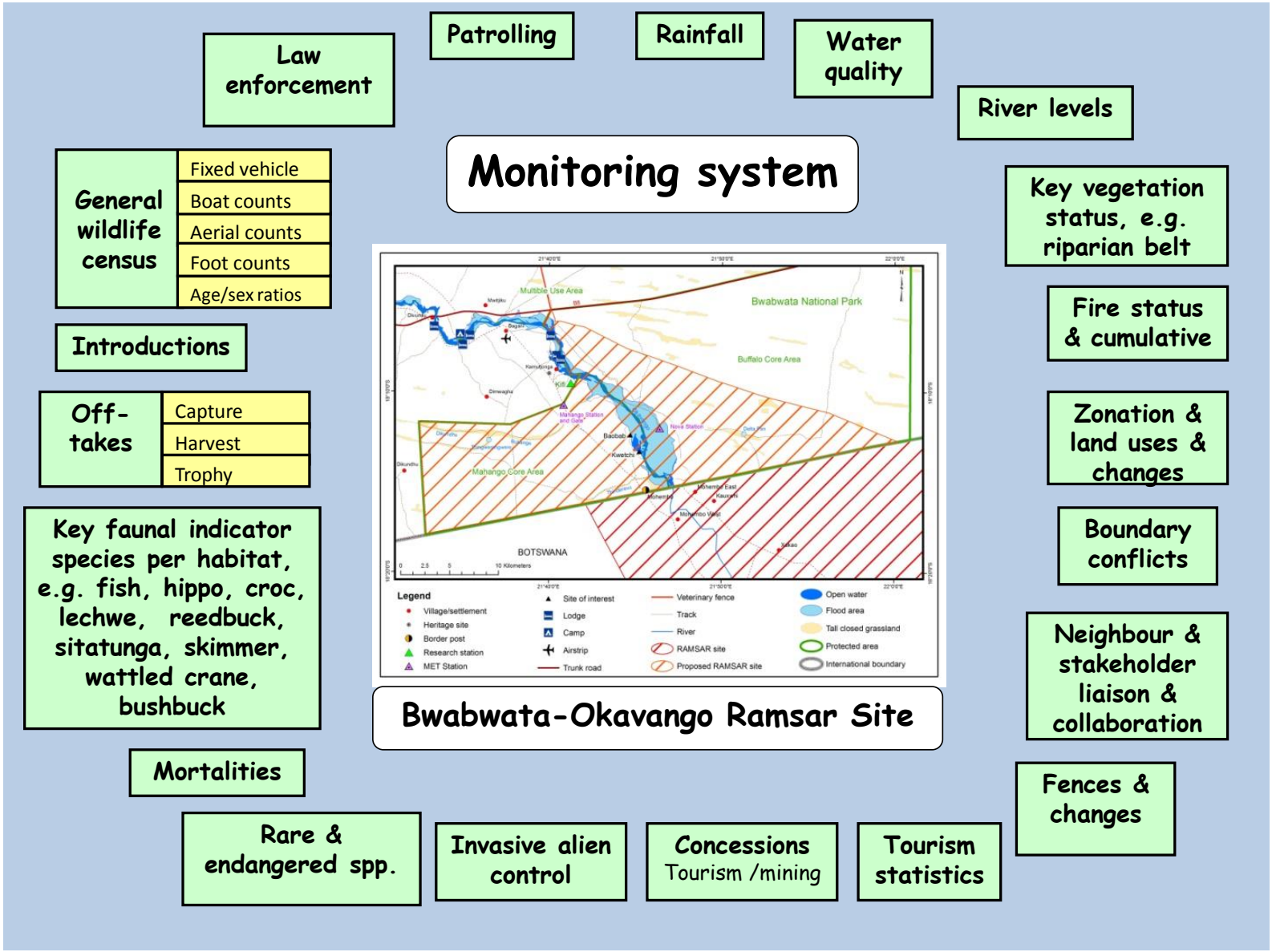


Figure 9. Example of potential Limits of Acceptable Change to be used to guide management intervention within the Ramsar Site.